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THE CANADIAN
ENTOMOLOGIST.

VOLUME IX.



Edited by William Saunders,

London, Ontario.

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ERRATA IN VOLUME IX.

The following corrections have been kindly sent us by J. A. Lintner, Albany, N. Y. :—

PAGE.	LINE.	CORRECTION.
29	13	For <i>melana</i> read <i>malana</i> .
90	5	" <i>robiginosaria</i> read <i>rubiginosaria</i> .
91	last.	" cinerofrons read cinereofrons.
92	27	" Stenopsis read Sthenopsis.
92	27	" argentimaculata read argenteomaculata.
96	28	" <i>Hemiluca</i> read <i>Hemileuca</i> .
98	2	" <i>Pholiosora</i> read <i>Pholisora</i> .
106	3	" <i>vautalis</i> read <i>rantalis</i> .
117	19	" eurydice read eurytris.
117	1	Place RHOPALOCERA before line 31, p. 116.
117	7	For <i>Nymphalides</i> B., read <i>Melitæa</i> Fabr.
117	27	dele melinus—a Californian species.
117	26	For lucillius read lucilius.
117	32	" <i>Palm.</i> read <i>Dalm.</i>
118	3	dele tenuis—a repetition.
118	7	Change SPHINGIDÆ to below HETEROCERA,
		line 31, page 117.
118	9	For chamoenerii read chamænerii.
118	8	" Carpenter read Charpentier.
118	14	" procris read Americana.
118	24	" Peraphora read Perophora.
118	24	" Hüb. read Harris.
118	31	" Hypurpax read Hyparpax.
118	32	" " " "
120	6	" <i>Charandra</i> read <i>Charadra</i> .
128	17	" <i>Smyrinthus</i> read <i>Smerinthus</i> .

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No. 1

HISTORY OF PHYCIODES THAROS, A POLYMORPHIC BUTTERFLY.

BY W. H. EDWARDS, COALBURGH, W. VA.

In the month of July, 1875, I chanced to be in the Catskill Mts., when Mr. Mead discovered the food-plant of *tharos*, as detailed by him in Vol. vii, ENT., p. 161, this being the common wild Aster, *A. Nova-angliæ*, and I obtained from him a cluster of eggs; also afterwards got others for myself by tying the females in bags over the stems of the same plant. The larvæ hatched, and while in their younger stages I brought them to Coalburgh. On the journey, stopping at several points, I had to give them leaves of such species of Aster as I could find, and they ate any and all readily—even German Asters from the garden. By the 4th of September they had ceased feeding, after having all passed two moults, and slept. Two weeks later, part of them were again active and fed for a day or two, when these gathered in clusters and presently passed their third moult, and became lethargic, each one where it moulted, with the cast skin by its side. I placed all the larvæ in the cellar, and so they remained till 7th Feb., when such as were alive (many had died from mould), were transferred to leaves of an Aster which had been forced in the green-house. The same day some were feeding. They all passed in due time two more moults, making a total of five in some cases. But whether those larvæ which moulted twice only in the fall did not pass three moults in the spring I cannot say. Further observations are necessary on this habit. The first chrysalis was formed 5th May, and its butterfly emerged on 18th, or after 13 days. Another emerged on 30th, after 8 days, this stage being shortened as the weather became warmer. There resulted 8 butterflies, all *marcia*, 5 ♂, 3 ♀, and all of the variety hereinafter designated C, except one ♀, which was var. B.

The first individuals of the species seen by me, in the field, at Coalburgh, were 3 ♂ *marcia*, on 18th May. A single ♀ was taken 19th, two

on 23rd, two on 24th, and these were all I saw up to the last date, although I carefully watched for them. Shortly after, both sexes became common. On the 26th I took 7 ♀, and tied them up in separate bags, on branches of Aster. The next day 6 of the 7 had laid eggs, the clusters varying from about 50 to 225 eggs each. They were always laid on the leaves, and usually on the under side of them, in rows nearly or quite straight, and touching each other. In the larger clusters the layers were three deep. These gave me hundreds of caterpillars, and each brood was kept separate. The butterflies began to emerge 29th June, the several stages being thus : egg 6 days, larva 22, chrysalis 5. There were four moults and no more, but much irregularity in every larval stage, so that some of the butterflies did not emerge till 15th July. Just after these larvæ hatched I went to the Catskills, taking one brood with me, and they reached chrysalis there, and in that stage were mailed back to Coalburgh. I returned by the time the butterflies from these chrysalids were emerging. There was no perceptible difference in the length of the several periods of this brood and the others which had been left at home, and none of either lot became lethargic. In my absence the larvæ had been cared for by a member of my family, charged to note carefully all changes. The butterflies from these eggs of May, with a single exception, were *tharos*, and this one was *marcia* ♀, var. C. This was the second generation of the season, counting the one which proceeded from the hibernating larvæ as the first.

On 16th of July, at Coalburgh, I again obtained eggs from several females, this time all *tharos*, as no other form was flying. The eggs hatched in 4 days, the larval stage was 22, and chrysalis 7; but as before, many larvæ lingered. The first butterfly emerged on 18th Aug. All were *tharos*, and none of the larvæ had been lethargic. This was the third generation in succession, and from the second laying of eggs.

On 15th Aug., at Coalburgh, I again obtained eggs from a single *tharos* ♀, and took them directly to the Catskills, and they hatched just as I arrived there, 20th. This was the fourth generation of the season from the third laying of eggs. The weather in Virginia had been excessively hot, and so I found it on the journey, but on reaching the mountains it was cool, and the nights decidedly cold. Two days after my arrival the mercury stood at sunrise at 40°. September was a wet and cold month, and I protected these larvæ in a warm room at night, and much of the time by day, for they will not feed when the temperature is less than

about 50° Far. The first chrysalis was formed 15th Sept., 26 days from the hatching of the larvæ, and others at different dates up to the 26th Sept., or 37 days from the egg. Forty per cent. of this brood, or 52 larvæ out of 127, became lethargic after second moult. I entered in my journal as follows: "16th Sept., 52 larvæ have ceased feeding at second moult." "26th Sept., fully one-half of the larvæ which had ceased feeding at second moult began to feed again, after resting a few days, and have now passed third moult." After which they became lethargic and so remained. I was much puzzled at finding in the summer that the broods then had but four moults, as I satisfied myself by repeated tests, and that, in each brood, inasmuch as I had noted down three fall moults in some cases, and two in the spring in the larvae of 1875, and written descriptions of them. Moreover Miss Peart had made a drawing of this third fall moult, and it did not correspond with any one of the summer moults, though plainly later than the second, and much smaller than the summer third, besides differing from it in markings. But in the brood of larvae, whose history I have just recited, the two moults show for themselves, as I have them now before me, and the third agrees with Miss Peart's figure. The species passes five larval moults in the winter brood, though perhaps but four in some cases, and there are but four in summer.

I returned to Coalburgh 15th Oct., and till I reached this place the weather on the way had been cold, with several frosty nights. So that for a period of 30 days, the chrysalids had at no time been exposed to warmth. The day I arrived, the butterflies began to emerge, and before the end of a week all that were living had come forth, viz., 9 males, 10 females. Several were dead, from bruises received on the journey. Of these 9 males, 4 were changed to *marcia*, var. C, 3 were var. D, and 2 were not changed at all. Of the 10 females, 7 were changed, 5 of them to var. B, 3 to var. C. The other 2 females were not different from many *tharos* of the summer brood, having large discal patches on under side of hind wings, besides the markings common to the summer brood.

Ten of the chrysalids of this brood I mailed from the Catskills to Mr. Lintner, at Albany, N. Y., asking him to keep them in a cool place and watch the result. I have before me from these chrysalids 6 butterflies, which emerged between 21st Oct. and 2nd Nov., all females, and all of var. B. Of the remaining chrysalids, Mr. Meske, in whose charge they were placed, writes, 27th Dec., that three seem to be still alive, and

one is dead. In nature I do not believe this species ever hibernates in the chrysalis stage. These butterflies were more completely changed than were those from the chrysalids brought to Coalburgh, as appears by comparison of the results in the two cases.

And 18 of the chrysalids I had placed on ice, 20th Sept., laying them in a tin box directly on the surface of the ice, the temperature of the house being 40° Far. Part were so placed within three hours after the forming of the chrysalis, and before they had hardened; others within six hours, and others within nine hours, and so all remained for seven days, that being the longest summer period of the chrysalis. On removing them from the ice, they seemed to me dead. They were soft, and when they became hard had a shrivelled surface. I brought them to Coalburgh, and discovered no sign of life till 21st Oct., when the weather suddenly became hot, the mercury rising to 87°, with a south wind. In two days 15 butterflies emerged, every one *marcia*, not a doubtful form among them in either sex. There were 10 males, 5 females; of the former 5 were of var. C, 4 of D, 1 of B. Of the 5 females, 1 was var. C, 4 of B. The other three chrysalids were dead. All the butterflies of this brood were diminutive, starved by the cold, but those from the ice were sensibly smaller than the others. All the examples of var. B were more intense in the coloring of the under surface than any I ever saw in nature, and the single male was as deeply colored as the females, and this also I never saw in nature. The examples of the other vars. were extreme, but not so unusual.

So much for the Coalburgh broods, and I am able to compare their behavior with those of the same species in the Catskills. When I went thither in June, arriving on the 18th, I found a few male *marcia*, var. D, flying, no females. This was exactly one month later than the first males had been seen at Coalburgh. The first female was now taken 26th June, and on 27th and 28th I took one female each day, all of them *marcia*, var. C. No more were seen, and no *tharos*, though I was daily in the fields. So that the first female was 38 days later than the first at Coalburgh. These three females I set on *Aster*, and two forthwith deposited eggs. The females of this species give fertile eggs when but a few hours out of chrysalis, just as I have shown, Ent., Sept., '76, that *Arg. myrina* may do.

The eggs thus obtained I mailed to Coalburgh, and returning soon after, found that they had hatched, 3rd July. The first moult occurred on the 9th, the second on 12th, the third on 15th, the fourth on 18th, and

the first chrysalis suspended on 20th, its butterfly emerging 29th July. So that the periods were, egg 6, larva 17, chrysalis 9 days. Five per cent. of this brood became lethargic after second moult. This, then, was the second generation of the butterfly of the season, from the first laying of eggs. All the emerging butterflies were *tharos*, no *marcia*, and all were characterized by an intense blackness of the dark portions of the wings, as compared with any Coalburgh examples. Also nearly all the females showed the discal band on fore wings above yellow, instead of fulvous. (This last peculiarity, the change in the band, appeared in some of the females of the *third* Coalburgh generation, but no other.) On the under side the reticulated lines were unusually heavy, and the marginal cloud and the brown patches largely extended and deep colored.

This second generation was just one month behind the second at Coalburgh. So far only could I trace the Catskill generation this year ; but, as in 1875, Mr. Mead obtained eggs on the 27th July and following days, the larvae from which all hybernated, that would be the second laying of eggs of the season, and the resulting butterflies the first generation of the following year.

So that, in the Catskills, the species is digoneutic, there being two generations annually, the first of which is *marcia*, or the winter form, and the other is the summer form, and a certain proportion of the larvae proceeding from the first hybernate (so far as appears) and all those from the second.

At Coalburgh there are four generations, the first of which is *marcia* and the second and third are *tharos*, and none of the larvae from these have so far been found to hybernate ; and the fourth, under exceptional circumstances, has produced some *tharos* and more *marcia* the same season, a large proportion of the larvae also hybernating. But had the larvae of this brood remained at Coalburgh, where the temperature for several weeks after they left the egg remained high, the resulting butterflies would have been *tharos*, and the larvae from their eggs would have hybernated. And here I may say that, in addition to the broods spoken of, I also raised others at Coalburgh out of the line of regular succession, as midway between the second and third generations, for example, and none of these larvae became lethargic, and the resulting butterflies were all *tharos*.

The altitude of the Catskill region in which I was is from 1650 to 2000 feet above tide water, and the highest peaks of the range were

directly near. The altitude of Coalburgh is 600 feet. As appears, the changing of the larvae from New York to Virginia, about 40° latitude, besides the difference of altitude, and the reverse, from Virginia to New York, had no perceptible influence on the resulting butterflies of the several broods, except in case of the last one, where the effect of the change of climate was direct on part of them, both as to the form and the size. The periods of the Catskill brood of June may have been accelerated a trifle by transference to Virginia, but not more, for the weather in the mountains at that time was warm; and the butterflies retained their peculiarities of color, which, as I have stated, were very marked. So also they retained their habit of lethargy, which, I may say in passing, is a very serviceable habit in a two-brooded species of butterfly, in a mountain region, and exposed to sharp changes of temperature. If the fate of the species depended on the last larval brood of the year, and especially if the larvae must reach a certain stage of growth before they were fitted to enter upon their hybernation, it might well happen that now and then an early frost, or a tempestuous season, would destroy all the larvae of the district. The species in the Catskills, in such circumstances, would probably be about as scarce as it now is on Anticosti.

On the other hand, the May brood, taken from Virginia to the Catskills, suffered no retardation of their periods, as compared with other larvae of the same generation left at home, nor was there any change of color, nor did any larva become lethargic. It might have been expected that all of the last brood taken to the mountains would have become lethargic, under the severe conditions to which they were exposed, but the greater number resisted change even in this habit. From all which we may conclude that it takes time to naturalize a stranger, and that habits and tendencies, even in a butterfly, are not to be changed suddenly.

The larvae of *tharos* are at no period protected by a web, either one common to the community, as with *phaeton*, or one for each individual, after the habit of *mylitta*, according to Mr. Henry Edwards, in lit. They are exposed, just as are the larvae of *nycteis*, and the only shelter either of these species have is what the leaf over them affords. I have left larvae of *tharos* on the growing food-plant, uncovered by any net, till after first moult, expressly to test the point of a web, as it had been suggested that these larvae might wholly change their natural habit in confinement, something that, so far as I know, larvae never do. The larvae of *nycteis* I have seen naturally on their food-plant until after

third moult, and there was not a thread of a web.* The larvae of *tharos* are sluggish, and a pretty sharp jar is necessary to cause them to drop from the leaf. This they do in a coil, and their bristles effectually protect them from all harm.

When about to moult, the larvæ bred by me ceased feeding, and collected in groups on the covers of the glasses in which I usually kept them, resting for about 36 hours. The body contracted, and as the time for the moult drew near, the skin became glassy as it separated from the newly formed skin beneath. The spines and bristles of the new skin lie folded down and back, and as the old skin, after splitting behind the head, is shuffled past the successive segments, the spines and pencils of hairs suddenly spring up, and the latter instantly become divergent. For some moments the old mask adheres to the new face, but the larva presently proceeds to rub it off with its feet. When the larva prepares for chrysalis, it spins a button of white silk, and hangs suspended for about 24 hours, its position being nearly circular.

As I have shown, *tharos* is polygoneutic in West Virginia, digoneutic in the Catskills, of New York. In a high latitude, or at a high altitude, we might then expect to find it monogoneutic, and restricted probably to the winter form *marcia*. And this is precisely what does occur in the island of Anticosti (about lat. 50°) and on the southern coast of Labrador opposite. Mr. Couper, who collected in 1873 on the island, informs me that *tharos* is a rare species there, though he saw it in localities 100 miles apart; that he saw no examples later than 29th June, from which date "it disappeared"; and adds, "I do not think any of the diurnals on Anticosti or in Labrador produce a second brood." When he left, 27th July, "the weather was becoming cold and very few butterflies of any sort were to be seen." Also, "the summer temperature of Southern Labrador and Anticosti are about the same." Of *tharos* from Anticosti Mr. Couper has sent me 14 males, 8 females. Of these males, all are var. D; of the females, 1 is var. C, 7 var. D. With these also came 11 males, 2 females from Labrador, all of same variety, D. All these examples are of reduced size, as might be expected from so cool a region.

Dr. Weisman states (See Can. Ent., Vol. vii, p. 232), that Dorfmeister was led by his experiments on the effect of cold on the pupae of butter-

* I found last summer that *nycteis* larvæ will eat asters as readily as *Actinomeris squarrosa*, which hitherto I had fed them on.

flies to believe that temperature exerts the greatest influence during the turning into chrysalis, but nearly as much shortly after that time ; and he considers it very possible that a period may be fixed at which the original tendency might be diverted more strongly. As related above, the chrysalids of *tharos* which were subjected to cold three hours after forming reached the same result as those which were exposed six and nine hours after forming. The period of exposure, 7 days, did not seem to me at the time very long for the purpose in view, especially as in Dr. Weismann's experiments the exposure had been from 34 days to three months. This too at a temperature of 33° Far., while in case of *tharos* it was but 40°. It is true, the greater part of the chrysalids of *tharos* which did not have an exposure to this artificial temperature also produced the winter form of the butterfly, but on the other hand some were not changed at all, whereas in all the chrysalids subjected to ice the change was complete and extreme. Nevertheless it would have been more satisfactory had chrysalids of the summer brood been experimented with, and if I live to another summer, I will test the matter. It seems to me very probable that a much shorter exposure to cold immediately after the forming of the chrysalis—a day or two, or even a few hours—may be found to divert the direction of the form, in this species.

There is a very great range of variation in the winter form. It exhibits at least four well marked types, and there are sub-varieties about each of, and connecting, these. The first, A, has the basal area of under side of hind wings (which area comprises half the wings, and is occupied by the reticulated lines, while beyond is a clear field for a certain space) whitened or silvered, as is also the whole series of sub-marginal crescents, and there is either no marginal cloud, or but the slightest ; the extra basal space buff. A sub-var. of this has the basal area whitened, but the rest of the wing clouded, and is between A and B. The second, B, has the whole surface, except a narrow border along costal margin, dark brown, running into blackish, but with a clear white or yellow belt formed of the outer reticulated lines, across the disk. Its principal sub-variety has the brown area broken, discovering a yellow ground, the belt remaining white, and is between B and C. The third, C, is variegated and gay, the ground being of a deep rich yellow, the marginal cloud extended quite to the belt, and ferruginous in color ; a large patch on the disk and another on costal margin, both ferruginous ; the reticulated lines of same color and distance, and a lilac flush over the whole hind margin. Sub-varieties of this have the

ground in shades of buff instead of yellow, the cloud and patches brown instead of ferruginous ; sometimes the discal patch large, triangular and occupying a large part of the basal area ; or in the form of an oblong band extending from middle of the wing to the inner margin, and met by a similar band filling the cell. C passes by grades into D. The fourth, D, has the ground color reddish-ochreous, the lines ferruginous, as also the extra discal points ; the cloud and both patches pale brown, often a mere wash of color ; on the fore wings the black spots are reduced and very pale, and the margin is pale fulvous and reddish-ochraceous. Of this type are the northern examples mostly ; but in the Catskills and White Mountains, and in West Virginia, the red tint is less decided and the cloud and patches deeper colored.

And this variety D gradually shades into the summer form, particularly in the male, so that many examples of this sex cannot be distinguished from many males of the summer form. There is not much variation in these last, they being generally characterized by a restricted marginal cloud, obsolete discal patch, and very small, if not obsolete, costal patch. But the summer females are of two distinct types, one closely like the male, and consequently also the male of var. D of the winter form ; the other quite different from its male, characterized by large brown patches on disk and costa, and a diffuse marginal cloud. This finds its counterpart in the female of var. D, or at any rate agrees most nearly with it, the peculiarities of the winter form being exaggerated in the summer.

Of these varieties, A is rare, and has appeared in none of the butterflies bred by me. I have occasionally taken it on the wing at Coalburgh, and in the Catskills. Var. B is common in W. Va., and nearly all the females taken in the spring are of this type ; in the other sex it is rather rare, most of the examples being of var. C. Through the South also as far as Texas, beyond which I have not followed the species, var. B seems to be the prevailing winter form. It becomes less abundant to the north of Virginia, appearing but occasionally in the Catskills. At Albany, neither Mr. Lintner or Mr. Meske ever met with it.

Var. C is common in W. Va., in the male, and somewhat so in the female. So also in N. Carolina, if I may judge by examples sent me by Mr. Morrison. But I have not seen it from farther South, nor from Texas. It is common in the Catskills, and is occasional even to the extreme northern limit of the species.

Var. D is rare in W. Va., but in the Catskills the male of this is most abundant of all ; the female much less so, being replaced by C and B to a great degree. Of 3 males, 3 females, sent me from New Hampshire by Mr. Whitney, and taken at random from his collection, all were of the winter form, var. D, except 1 female of the summer form. From Canada, Labrador and Anticosti, all the examples received were D, with an occasional exception of var. C. Of 4 males from Colorado, all were D ; of 2 females, 1 is D, 1 C. From Lake Lahache, Br. Columbia, lat. 54°, and perhaps the most northern limit of the species, I have 1 male D, 1 female C. From New Mexico even, taken high in the mountains, 2 males are decidedly of var. D, and similar to the usual type from Anticosti in markings, the under side also being like that, red-tinted.

(To be Continued.)

DESCRIPTION OF A NEW BOTIS ALLIED TO FLAVIDALIS.

BY A. R. GROTE,

Director of the Museum, Buffalo Society Natural Sciences.

I have received from Mr. Frank W. Langdon, of Madisonville, Ohio, a specimen (♀) of a new species of *Botis*, which I name *Botis Langdonalis* after its discoverer. It is one of the largest and most striking forms yet made known, and belongs to the group of *flavidalis*, with which it agrees in the general color of body and wings. The fore wings from base to first transverse line are clouded with fuscous, and stained with ochreous. The two discal marks are present, the orbicular a dot, the reniform a streak. The space between the exterior transverse or elbowed line and the subterminal line is much *wider* than usual, and this space is filled in with a broad fuscous band crossing the hind wings as well ; the lines are only indicated by the contrast of color. An ocher discal dot on hind wings. Beyond the broad common band the terminal space is narrowly yellow on both wings. Beneath white, opalescent, with discal dots and the broad shade band repeated. Palpi white tipped with ferruginous ; body white beneath. *Expanse* 37 mil. *Length of body* 18 mil.

NOTES ON MELOE ANGUSTICOLLIS.

BY W. BRODIE, TORONTO, ONT.

In the Editor's "Notes on Cantharides," published in the December No. of the ENTOMOLOGIST, there are some particulars in reference to *Meloe angusticollis* which differ somewhat from my own observations on this species, extending over a period of seven years. According to my experience, *Meloes* make their appearance in the perfect state about the end of August or beginning of September, when they feed greedily on *Ranunculus acris*. Later in the season, when the abdomens of the females are much enlarged, they pair, and later still—sometimes after the first frost—they deposit their eggs and invariably die that season.

The larvæ emerge from the eggs early the following spring, and I think attach themselves to bees generally on the blossoms of the willow. I presume this because I often find females about to oviposit near to willow bushes, but I have detected the young larvæ in the flowers of *Caltha palustris*, and suppose they will take to any early flowering plant.

In confirmation of these statements I submit the following from my notes on *Meloe* in the vicinity of Toronto, dating from 1870.

Although *Meloe* is common here, I have never found them much further to the north, and as I am pretty well acquainted with all parts of the county, I would say they are not found in the central nor in the northern portions of the County of York. This is curious, as in the better wooded sections the storing Hymenoptera are more numerous than about Toronto.

1870—Aug. 30th. In early morning saw several *Meloes* descending a white oak tree, in St. James' Cemetery, which tree was afterwards blown down and proved to be a *bee tree*. This would indicate that *Meloe* pupates in the hive, and when perfect, deserts it during the night.

1871. *Meloes* first seen Aug. 10th.

1872—Aug. 20th. *Meloes* feeding on *R. acris*.

1873—Aug.-Oct. *Meloes* very numerous, feeding on *R. acris*; found many females ovipositing in a cold, wet situation, after first fall frost.

1874—Aug. 29th. Found about forty *Meloes* closely huddled in a ball; they were not fighting, and although both sexes were present, do

not think they were pairing. None of the females had large abdomens, and when disturbed they all quickly ran away.

Sept. 1st—10th. Found about sixty *Meloes*, of both sexes, many of them pairing; feeding on *R. acris*, on a small miry patch, about one-fourth acre, bounded on the right by a small stream, which they could not cross; on the left, about 150 yards up a bank, were six hives of neglected bees. This is the same situation where, in 1873, I found females ovipositing after frost.

1875—Aug. Found *Meloes* in same localities as last season. Captured several females; fed them on *R. acris*; they began ovipositing Sept. 20th. Oct. 20th, all dead. The eggs were of an orange color, and placed in a hole about $\frac{3}{4}$ inch deep and large enough to receive the abdomen.

1876—Aug. 15th. *Meloes* first seen. Sept. 1st, found about fifty in a ball, as I had found them in 1874. Do not think they were either fighting or pairing; could not make out what they were doing; when disturbed they soon ran away. This season they were about as numerous as in 1875, in same localities at same dates.

From these notes, from my own recollections and from the recollections of my children, I infer that *Meloes* make their appearance about the middle of August, that they pair and oviposit before the winter sets in, and that they never survive the winter; and also that they are very seldom, if ever, found under stones in the neighborhood of Toronto.

[We are very glad to get these highly interesting and valuable notes from our esteemed correspondent, and hope to hear from him again before long. As *Meloe angusticollis* is rarely found in our neighborhood, most of the statements made in reference to it were given by us as the results of the observations of others.—ED. C. E.]

NOTICE.

Tortricidae.—I shall be much obliged for specimens of *Tortricidae* from collectors in all parts of the U. S. and Canada, as I am now working on that group. Credit will be given to all persons supplying me with material. It is desirable that notes should be furnished of food plant or date of capture. All material sent to me will be determined as fast as possible, and on the completion of my work, sets of specimens will be returned named to the contributors.

A. R. GROTE, Buffalo Society of Natural Sciences.

ON SAMIA GLOVERI AND COLUMBIA.

BY DR. H. HAGEN, CAMBRIDGE, MASS.

The type ♀ specimen of *Samia Gloveri* having been presented by Mr. Strecker to the collection in the museum of which I have charge, I have most carefully compared it with the type ♀ specimen of *S. columbia*. I am bound to state that *I cannot find* any difference except the rosy color of *Gloveri*, and there are no characters which I consider of value to separate the two species. I freely admit that the examination, however carefully made, of only two specimens, both of which are old and in poor condition, is scarcely sufficient to determine this point, but I wish to draw the attention of students who may have a larger amount of material for comparison, to the facts stated, with the hope that the true relationship of these insects may be determined.

The suggestion that *S. Gloveri* is perhaps produced by the different conditions surrounding it in the country in which it is found (a salt deformity) is very easily made, but I should object to such a conclusion until we are placed in possession of fuller information regarding the early stages of both species. It would be very interesting and important to know with certainty whether any other Lepidoptera from Utah and Arizona present similar differences in color, among the same or related western and eastern species.

TINEINA.

BY V. T. CHAMBERS, COVINGTON, KY.

ERRATA.—Ante p. 19, tenth line from top, for “Drura” read Denver. Ante p. 136, eighteenth line from bottom, for “Philonome Staintonella” read P. Clemensella.

Laverna grisseella Cham.

This proves on comparison of specimens to be identical with *L. Murtfeldtella* Cham.

Gelechia glandifuelia Zell.

Further examination satisfies me that *G. sella* Cham. is the same species.

G. gallaesolidaginis Riley.

The specimens bred by me in the Rocky Mountains (see *Cin. Quar. Four. Sci.*, v. 2, p. 289) belong to this species, but as suggested (*loc. cit.*) they are much smaller and the markings are indistinct.

Gelechia roseosuffusella Clem.

I have received specimens of this species from Mr. J. D. Putnam, which were taken at Springlake Villa, Utah. It is very widely distributed over North America.

Glyphipteryx montinella Cham.

This species may be distinguished by the fact that the large dorsal streak is behind the first costal streak and opposite to the second, with which it is sometimes confluent ; besides, the first costal streak is as large or sometimes even larger than the large dorsal streak. In some specimens there is a dorsal white spot on or near the base ; the apical half of the fore wings is rather golden brown than golden, as I have described it. The form of the hind wings is like that of *G. equitella*, but much broader, while *G. exoptatella* has these of the same form, and not wider than in *equitella*, or but little so.

Coleophora bistrigella Cham.

In the description of this insect I have considered the golden or "pale sordid ochreous" as the ground color. It will perhaps be more easily recognized if we consider the white as the ground color, with two wide golden-yellow streaks from the base : the first being the widest and going to the apex, and the second near to the dorsal margin.

Gracilaria (Coriscium) quinquestrigella Cham.

A typographical error (I suppose) in the description of this species makes me say : "annulus about the middle of the third joint at its tip" ; the words "and another" should be inserted after "joint." Possibly (though I do not think so) I have two species before me, though there is some variation in the ornamentation. The first four costal white streaks differ in length in different specimens. (These all point obliquely back-

wards, whilst the fifth one, separated a little from the others, points obliquely forwards.) The wing behind the fifth costal streak is a little darker than elsewhere, and some specimens may be said to have a large brownish apical spot. There is a dark brown hinder marginal line at the base of the ciliae, which are tipped with brown at the apex. The line of union of the white of the dorsal margin with the brown color of the wing is irregular, and in some specimens it is marked by distinct brownish spots, and sometimes the white of the dorsal margin contains behind the middle a narrow brown longitudinal line which passes obliquely down towards the apex.

G. alnivorella Cham.

I find a specimen of this species among a few species sent to me from Lake Villa, Utah, by Mr. J. D. Putnam.

Helice palidochrella Cham.

Though the larva is unknown, I am convinced that it feeds in some way upon *Gleditschia triacanthos*. In Kentucky it makes its appearance in the imago about the 15th of May, resting on the trunks of *Gleditschia* trees with the wings horizontal and a little divergent, and the head lowered and abdomen raised. Sometimes the fore wings are so densely dusted towards the apex as to give the appearance (to the inward edge) of a small brown spot lying along the base of the costal ciliae; the base of the costa is usually brown, and sometimes there is a small creamy patch on the wing before the first costal streak, which is a narrow triangle with the apex at the fold, and is sometimes margined before and around its apex with a creamy or pale ochreous color. The legs and abdomen are dark brown or blackish, annulate with white, and the anal tuft is white.

CANADIAN HEMIPTERA WANTED.

At the request of our esteemed correspondent, Dr. White, we gladly find space for the following notice, and trust that during the coming season some of our energetic collectors will devote some attention to this order and aid Dr. White by sending him material.—ED. C. E.

TO NATURALISTS AND OTHERS.

As I am at present working at the Hemiptera of the world, I should be very much obliged for specimens from any part. For the benefit of those who may kindly wish to help, I give a few hints on the collection and preservation of this neglected order of insects. Hemiptera (which include the various insects popularly known as Plant-bugs, Tree-hoppers, Cicadas, Fireflies, Aphides, &c.) resemble in general appearance Beetles, but have more membranous upper wings (or wing cases), and are usually of softer consistence, besides having their mouth provided with a rostrum or proboscis, instead of jaws. In size, Hemiptera vary from an inch or more to less than one line in length. In color they are also variable, some being exceedingly brilliant, others very obscurely colored. They inhabit trees, shrubs and low plants; some run about on the damp margins of streams and lakes, some inhabit the surface of the water, and others swim in the water or crawl on the mud below. A few live under the dead bark of trees, and are usually flat and dull colored. The best mode of catching those on trees and shrubs is by shaking the branches over an inverted umbrella; those that are found on or under low plants (grass or other herbage) may be collected by sweeping the herbage with a net (which can easily be made out of a ring—12-18 inches in diameter—of stout wire, attached to a stick, and having a bag of canvas sewn on to it). They may also be found by searching on flowers and leaves. Those at the margin of the water may be found by searching; those on and in the water by using a net similar to the sweeping one, but with canvas open enough to allow the water, but not the insects, to pass through. Rather shallow, still water, among weeds or in open places among weeds, are the best situations. Many species fly into houses at night, attracted by the lights. In habits these insects are variable: some move slowly, others run or fly with celerity, and others (Tree-hoppers, &c.) jump with great activity. As many species closely resemble each other, it is desirable that *all* specimens met with should be secured. It is also desirable that *small* species as well as large ones should be collected, as it is among the former that most undescribed forms may be expected. To kill and preserve these insects, all that is necessary is that on capture they are put in a bottle filled with spirits of wine (rum, whiskey, &c., will do). Care must be taken, however, that the bottle is kept filled with fluid, otherwise the specimens will be shaken about and broken. So in transit great care must be taken to guard against the evaporation of the spirit. The bottles,

if not filled to the top with specimens, should have the empty space filled with crumpled pieces of paper, then filled with spirit, and tightly corked ; all the bottles may then be packed into a larger one, or jar, also filled with alcohol and tightly corked.

In return for any specimens (few as well as many) kindly sent to me, I shall be happy (if wished) to return named specimens, or to give in return named British Lepidoptera, Coleoptera, Hemiptera, or Flowering Plants ; or in certain cases I shall be glad to buy specimens.

Communications may be addressed to

DR. BUCHANAN WHITE, Perth, Scotland.

CORRESPONDENCE.

DEAR SIR,—

In ENT. for Nov., Mr. Lyman calls attention to an apparent discrepancy between a statement made by me as to the appearance of the sexes of butterflies and the facts as he has observed them. My statement had reference solely to the butterflies emerging from chrysalids of bred larvæ. No one has failed to observe in the field that the males of most butterflies are seen from several days to two weeks earlier than the females. I have repeatedly mentioned this myself. See notes on *ajax*, on *aphrodite*, and *pseudargiolus*, in Butt. N. A., vol. 1 ; also, on *cybele*, ENT., 6, 124. Nevertheless, in breeding I have found that either sex may first appear, or they will alternate irregularly until the whole brood has emerged. See mention of this on page 11, Butt. N. A., where of two broods of *ajax* the females first emerged. It is so with all *Papilios*, *Colias*, *Graptas*, etc., etc., that I have bred in any numbers. Of course when one or two butterflies of a brood only were raised, the result would be of no value. Thus a single *diana* and a single *aphrodite* emerged out of a large number of larvæ hatched of each. But in other cases I have bred the butterflies by scores and hundreds, and the result was as stated. In case of *clyton*, the behavior was different ; see Butt. N. A., vol. 2. Why such differences between species of butterflies occur, or why bred examples should behave differently from those in the field, I do not attempt to explain.

W. H. EDWARDS, Coalburgh, W. Va.

ON THE HABITS OF AMBLYCHILA CYLINDRIFORMIS, SAY.

DEAR SIR,—

This beetle, usually considered very rare, is, I am satisfied, much more common than heretofore supposed.

I base this opinion on my own observations, and have a good collection to sustain it. Their peculiar habits are evidently the great cause of their rarity, and, once understood, I am positive they will become quite common.

Their geographical distribution is, so far as is now known, rather limited ; yet there is now no reason to suppose that they will not eventually be found extending over a large portion of Kansas and Colorado.

The following is such as I have learned concerning them :

Nocturnal (Crepuscular) rarely being taken until after sunset, and occasionally in the early morning. Found usually along clay banks, where they live in holes generally made by themselves, where they find that seclusion so congenial to their nature. The state of the weather affects appreciably this insect. When cold and blustery they remain concealed, preferring a warm, balmy air ; occasionally a *warm, cloudy afternoon* will entice them from their retreats, but this is rarely to be expected. Like the rest of the *Cicindelidæ*, they are predaceous. They also feed on effete matter. In many of their habits they are like *Asida*.

HARRY A. BROUS, Manhattan, Kansas.

ON CAPTURING CATOCALAS IN THE DAY-TIME.

DEAR SIR,—

According to promise, I give you my method of capturing *Catocalas* in day-light. I very seldom take my net with me when hunting them, as they are such lively insects when in the net that they are sure to injure themselves by rubbing the scales off the thorax, which spoils their appearance. I take with me a long blue beech sapling, a wide-mouthed wine-glass with the bottom broken off, a piece of pasteboard and a small bottle of chloroform. When on the ground where I usually hunt them, which is a wood of white oak and hickory, I commence by rubbing the blue beech stick quickly up and down the side of the tree. The *Catocalas* usually settle low down on the trees, and when disturbed by the noise made by rattling

the stick, they fly off to some other tree near at hand, where they settle with head down and wings closed. I then go quietly up and place the glass over the insect, and with the other hand push the pasteboard under the glass and secure it; a few drops of the chloroform having been poured on the pasteboard, the moistened part is slipped under the glass, and in a very short time the moth is quiet, when I pin it and put it in my box, and start for more game. In this way I rub every oak and hickory tree that comes in my way. I find that the insects prefer the trees of medium size and that some of the darker-winged varieties are oftener met with on the hickory and red oak; yet from the white oak I have obtained by far the greatest number of species and specimens.

The best time in the day for operating is, I think, from 1 to 4 p. m. As the evening advances the moths become more restless and often alight so high up on the trees as to be out of reach. In such cases I have sometimes tied the glass to the pole, and when secured, have drawn them carefully down, rubbing the glass against the bark; this, however, requires to be done very carefully, or the insect will be injured. Sometimes the insects settle with their wings open and head pointing upwards, when they are much more difficult to approach, and if disturbed, will often fly upwards and settle high on the tree.

As to weather, I have succeeded best after a very warm day and night, with the wind southerly; if the wind is a little strong, so much the better, as the moths will not then fly so far when disturbed. They always sit on the north side of the tree, and when the wind is easterly or northerly very few will be found. I have tried the Cyanide bottle, but prefer the wine glass and chloroform, as I think that when treated in this way the specimens have a fresher look. When the weather is windy, I have often observed the black-winged varieties fall to the ground when disturbed, and hide themselves among the grass. In the manner thus detailed I have captured *Catocalas* for seven years past with much success.

WILLIAM MURRAY, 115 Maiden Lane West, Hamilton.

LARVA OF THYREUS NESSUS.

DEAR SIR,—

I am not aware that any description of the larva of *Thyreus (Amphion) nessus* has been given, so I send you the following extract from my notes :

Mature larva of *Thyreus nessus* Cram.—Two and a half to three inches in length, tapering gently from the fourth segment to the head. Color—uniform chocolate brown, thickly dotted over the body, and particularly along the dorsal line, with dark umber, of which color are also the eight lateral or stigmatal stripes. Anal horn on eleventh segment, very short, one-fifth of an inch in length. Very sluggish in its movements, showing none of the irritability of *T. Abbotii* when touched. When at rest, it stretches itself at full length along the leaf, or leaf stem, of the plant on which it feeds, never raising or retracting the anterior segments.

Pupa dark brown ; formed either among rubbish on the surface of the ground, or slightly beneath the surface. Tongue case internal, not visible

Feeds on fuchsia. Pupa 11th, 12th, 13th July. One imago on 8th August. Two others not yet emerged, and probably will winter in the pupa state. Notwithstanding the presence of the anal horn, and the difference in habit betwixt it and *Abbotii*, I regard *nessus* as a true *Thyreus* and recommend its restoration to that genus.

Parthenos nubilus Hüb.—I propose to substitute for the above generic name, which is also occupied by a genus in Rhopalocera (Hüb. Verz. bek. Schmett., p. 38, 1816), the generic name *Catocalirrhus*, reading thus : *Catocalirrhus* W. V. A., *nubilus* Hüb. My reason for changing the name in Heterocera instead of in Rhopalocera (no law preventing it), is on the ground of convenience, the butterflies having a majority of species in this genus. Furthermore, I feel certain that after a little more investigation we shall be able to refer *Catocalirrhus* to *Catocala*.

W. V. ANDREWS, 36 Boerum Place, Brooklyn, N. Y.

BLACK VARIETY OF *P. TURNUS*.

DEAR SIR,—

In answer to Mr. W. H. Edwards' query concerning the northern limits of the black variety of *P. turnus* ♀, I would say that at Omaha, in this State, the dark variety is more frequently met with than the yellow one. Here at West Point, the species is not so common on account of the scarcity of its food-plants ; however, we have both varieties in about equal numbers. The same can be said of this insect as far north as the Niobrara River, where the species seems to become quite scarce.

LAWRENCE BRUNER, West Point, Nebraska.

The Canadian Entomologist.

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No. 2

NEW NOCTUÆ.

BY A. R. GROTE,

Director of the Museum, Buffalo Society Natural Sciences.

Glaea carnosæ, n. s.

Size moderately large; eyes naked; tibiæ unarmed; abdomen flattened, with a dorsal carina. Thorax carmine or vinous pink. Fore wings of the same hue over dull olivaceous; the stigmata indistinct, moderate, deep pink with yellow-olive powdery borders; lines obsolete; subterminal indicated and in color like the annulets to the ordinary spots; fringes clear pink. Hind wings lighter pink, with slightly obscure bases and concolorous fringes. Abdomen yellowish pink, with yellow anal hairs. Beneath marked with bright pink; no lines; traces of pink discal marks. Head deeper colored; antennæ pale; breast rich pink. *Expanse* 45 mil. Hab. Oldtown, Maine; Mr. Charles Fish.

I have previously seen a specimen of this fine species in the collection of Mrs. Bridgham, from Rhode Island, as well as the pink egg, if my memory serves me.

Fishia, n. g.

The tibiæ are armed; eyes naked, with lashes. Male antennæ brush-like. Cut of the wings as in *Mamestra* (*i. e., subjuncta*); primaries widening outwardly. Thorax with posterior tuft, and the base of the abdomen strongly tufted. The genus thus combines features of *Mamestra* or *Hadena*, with those of *Agrotis*. The fore tibiæ appear to be unarmed; the tongue weak.

Fishia enthea, n. s.

Dull coal black. Ornamentation like *Mamestra subjuncta*. Markings velvety black. A basal dash. Ordinary lines strongly dentate, approx-

imate inferiorly ; claviform touching t. p. line. Stigmata large, concolorous, with incomplete narrow edging. Orbicular large, decumbent. Reniform transverse. T. p. line forming a shallower, more strongly marked and wider sinus on submedian space. Black sagittate dashes surmounted with olive powderings (which mark the s. t. line) on subterminal space between the nervules are continued on terminal space, and become obsolete inferiorly. Hind wings paler, fuscous, powdered with blackish. At the base of the concolorous fringes on primaries a pale line, including pale points at extremity of nervules. No median line on hind wings ; a narrow black terminal line and pale line at base of fringes. Body concolorous ; tegulae and thorax faintly lined. Beneath paler, with discal marks on secondaries. *Expanse* 43 mil. Hab. Oldtown, Maine ; Mr. Chas. Fish, to whom the genus is dedicated.

Cosmia infumata.

I am indebted to Mr. Meske for the information that Dr. Speyer has compared this form (described by me under the allied genus *Orthosia*) with the European *paleacea*, and finds the two very closely allied. Also that *Mamestra dissimilis* var. *discolor* Speyer, is my previously named *Mamestra atlantica*, which may be held to represent the European species with us ; *atlantica* seems to be always distinguishable. Mr. Meske has also drawn my attention to the fact that the tibiae in *Homopyralis discalis* Grote are distinctively pilose.

TINEINA FROM TEXAS.

BY V. T. CHAMBERS, COVINGTON, KY.

In a former paper I have mentioned the fact then known to me only through Dr. Packard's "Record," that Prof. Zeller had described a large number of American Tineina, some of which would no doubt prove to be identical with some described by me. Since then, by the kindness of Dr. Hagen, I have obtained Prof. Zeller's paper, and such species as I have been able to identify by means of his figures and descriptions, are mentioned below, and in addition thereto I think it probable that a few (not more than three or four) other species will be found to have been

described by both of us ; but of these I am not by any means certain. I do not recognize *Xylesthia Clemensella* Cham. in any of his descriptions, nor do I find among them anything like the two species that I have described under the generic name *Polyhymno*, while his *Gracilaria* is certainly new. From the seeming abundance of the beautiful *Gelechia elegantella* Cham., I had expected to find it among the Professor's species, but it is not there. Indeed, considering the large number of species described from the same region (North, Middle Texas) by both Prof. Zeller and myself, it is a little singular that many more have not been found common to both collections.

Gelechia quinella Zell.

This is the Texan variety of *G. cercerisella* Cham., vide ante v., pp. 230 and 231. *Cercerisella* has priority.

G. leuconota Zell.

This may be *Phetusa plutella* Cham., and if so, *leuconota* has priority. But Prof. Zeller's figure represents a projection of the white of the dorsal margin into the dark color of the costal half before the middle, which is absent in my three specimens, or very faintly indicated, and the same may be said of the narrow oblique white streak behind the middle, and of the small black costal spot before the apex. But as none of my three specimens is now in perfect condition, this may possibly account for the difference. If the insects are not the same, they resemble each other closely, and both are allied to *Evippe prunifoliella* Cham.

G. pudibundella Zell.

I am not sure that I gather a correct idea of this species from Prof. Zeller's description ; but if I do, I think it will prove to be the species previously described by me as *G. rubensella*, the larva of which has been bred and described by Miss Murtfeldt. I have taken it in Kentucky and received it from Missouri and Texas.

Nothris dolabella Zell.

Has been previously described by me as *Ypsolophus eupatoriella*. If Prof. Zeller is right in referring it to *Nothris*, it is *N. eupatoriella*, which has not only priority, but tells the food plant. I have bred and captured it here, and have received it from Mr. Belfrage, collected in Texas. It is widely different from *N. griseella* Cham., also received from Texas. I

am now satisfied that *Begoe costalutella* Cham. is the same species, a little worn and with the tuft of the second palpal joint so evenly and smoothly recurved as to give us the palpi of a *Gelechia*. In some of my specimens of *eupatoriella*, both bred and captured, the blackish spot or streak over and above the fold resembles that of *Gelechia bilobella* as figured by Prof. Zeller, as much as it does that of his figure of *dolabella*.

G. serrativitella Zell.

Prior and equal? to *G. plutella* Cham. I think it is the same species, but Prof. Zeller's figure represents the dorsal margin darker than in my specimens, and the projections of the pale costal hue into the dark dorsal portion as more distinct, and the one before the middle is lacking in my specimens, which have a small whitish dot at the end of the cell not represented in the figure.

G. olympiadella Zell. has some resemblance in the white marking of the wings to *G. trifasciella* Cham., but it is clearly a very different insect.

G. glandifera Zell. has some resemblance to *G. (Sinoe) fuscopallidella* Cham., though quite distinct from it. The pattern of ornamentation is the same in both species, and in *G. obliquistrigella* Cham.

Æcophora determinatella Zell.

This is probably the same as *Æ. australisella* Cham., but if so, the figure is very imperfect, or was made from badly rubbed specimens. In *australisella* the circular yellowish spot at the end of the disc is entirely surrounded by the brownish color; is not connected with the white dorsal spot, and is preceded and followed by a narrow and faint silvery or grayish fascia. More properly, these grayish fasciæ are not composed of gray scales, but the brown scales both before and behind the fascia shine with a grayish lustre. In Prof. Zeller's figure, however, these fasciæ are not represented, and the spot instead of being completely round, passes out backward to unite with the dorsal white spot. In *australisella* this white spot is simply the dorsal end of one of the fasciæ, whiter and more distinct than the remainder. Still I have no doubt it is the same species, and *determinatella* has priority as the specific name. I have a worn specimen agreeing with Prof. Zeller's figure in all respects.

(As will be seen by referring to the June No., 1875, the description of

australisella was by some mistake not published, and believing it to be the same with *determinatella* Zell., I determined not to publish it.)

Æ. constrictella Zell.

The size and ornamentation of this species, as described and figured by Prof. Zeller, are so nearly identical with those of *Theisoa bifasciella* Cham., that I was at first convinced it was the same species, and can now, after the most careful examination, only doubt whether they are the same. *T. bifasciella* was described by me in the CAN. ENT. for 1874, and consequently, if they are the same, *constrictella* is the specific name by priority. But if they are the same, the reference of the species to *Æcophora* is certainly very wide of the mark. It is true the characters of the head and appendages of *bifasciella* might do for those of an *Æcophora*; and it was owing to these characters and the position of the insect in repose that I separated it under the generic name *Theisoa* from *Elachista*, to which it is, in my judgment, much more nearly allied than to *Æcophora*. The insect in repose sits, or rather stands, with the body elevated above the surface on which it stands, with the wings horizontal and a little separated or spread, and the head a little lower than the apex of the wings. But the wings are too narrow and ciliæ too long for *Æcophora*; and the neuration is widely different. The neuration and form of the hind wings is exactly that of *Elachista obscurella* (*Ins. Brit.*, v. 3), except that the subcostal vein is distinct throughout its entire course; and the fore wings only differ from it by having the median subdivided into two instead of three branches; but one of these branches is furcate; and the second branch of the apical vein (the one going to the dorsal margin) is absent in *bifasciella*. The cell is unclosed in the hind wings, and the submedian vein of the fore wings is not furcate at the base. The neuration is still nearer to that of *Elachista præmaturella* Clem. Surely such an insect as this can not with propriety be placed with *Æcophora*! Prof. Zeller says: "*Fascia ante medium cinnamonea, exterius albido-marginata*," &c., while I describe it *loc. cit.* as "basal third of primaries pale saffron slightly suffused with fuscous," and "at the basal third of the primaries a silver white fascia dark margined internally," &c. A reference to Prof. Zeller's figure shows that both descriptions mean the same thing. He defines the color perhaps more correctly than I do. The color gradually increases in density from the base backwards, and just before the fascia suddenly becomes a little darker and ends in a narrow row of brown

scales ; in some specimens this sudden darkening does not take place ; it is gradual up to the line of dark scales. It is unimportant whether we say a cinnamon fascia margined behind with white, with Prof. Zeller ; or a white fascia dark margined before, as I have it. This fascia is sometimes in *bifasciella* much curved, as Prof. Zeller has it, while in other specimens it is almost exactly straight. The white fascia of Prof. Zeller is more distinctly defined behind than I have ever found it in *bifasciella*, where it gradually passes into the pale cinnamon yellow which increases in intensity to what I have called the second fascia ; this second fascia sometimes crosses the wing as in Prof. Zeller's figure, but is never so wide or so distinctly outlined behind, but perhaps more frequently it is widely interrupted in the middle so as to make a costal and opposite dorsal white streak, as I have elsewhere mentioned, and in a specimen now before me it crosses one wing, while in the other wing it is simply represented by a costal streak hardly reaching the middle : the dark costal triangular spot of Prof. Zeller is distinct in every specimen that I have examined, but I have never found in any specimen the opposite elongate, narrow, somewhat paler dorsal triangle which in the figure extends to the apex of the costal triangle. The small discal dot of the middle of the wing is sometimes present, and sometimes absent in *bifasciella*. I think the wing behind the first fascia is more correctly described as pale saffron somewhat suffused and dusted with brownish, than as cinnamon ; but some specimens are much paler than others. In *bifasciella* the costal margin behind the second white fascia is fuscous (but little paler than the costal triangular spot before it), and much darker than the remainder of the apical part of the wing, and forms a definite spot much darker than it is represented by Prof. Zeller ; and he represents a narrow whitish line extending along the base of the dorsal ciliae, widest at the apex of the wing and narrowing to a point at the beginning of the dorsal ciliae, which I do not find indicated in any of my specimens of *bifasciella* ; and the hind wings of this species are pale silvery yellowish, or perhaps as properly, pale luteous.

If my specimens do not belong to Prof. Zeller's species, the resemblance in coloration is astonishing, and if they do belong to it, then the form and neururation of the wings place it among the *Elachistidae*, and not in *Ecophora*.

(To be Continued.)

NOTES ON A COLLECTION OF CANADIAN MOTHS MADE
BY WM. S. M. D'URBAN, AND NAMED BY F. WALKER.

BY A. R. GROTE,

Director of the Museum, Buffalo Society Natural Sciences.

The collection which forms the subject of this paper was kindly presented to the Ent. Soc. Ont. by Mr. D'Urban, and the specimens are kept for reference in the form in which they were given, because they were determined by Mr. Walker, the labels all being in his handwriting and many of the insects being types of his species. Many of the species were collected in the valley of the River Rouge, and some of them are mentioned in two papers in the *Canadian Naturalist and Geologist*, vol. 5, pages 91-6, and vol. 6, pages 36-41.

"*Pyrallis* n. sp.?" v., 95. The specimen here described is *Asopia devialis* Grote.

"*Dasychira clandestina*," vi., 36. This ♂ specimen seems to be a distinct species belonging to the genus *Gluphisia*.

"*Audela acronyctoides*," vi., 37. The species and genus in this instance appear to be good, and not otherwise known in collections. The specimen is in poor condition, but its ornamentation being marked, the species is quite recognizable; there are no antennæ remaining. Mr. Walker gives them as "slightly pectinated, branches sub-clayate." The species is slenderer, but distantly recalls *Platycerura furcilla*.

"*Bryophila* ? *spectans*," vi., 38. Is *Microcalia fragilis* of Guenée.

"*Microcœlia* ? *retardata*," vi., 38. Is *Acronycta dissecta* G. & R.

"*Cleora limitaria*," vi., 39. The specimen so named approaches very closely to *Lobophora vernata* Packard.

Two new species of *Cleora* and five of *Boarmia* are then cited by name, without description. Good specimens labeled with these names are contained in the collection.

"*Acidalia junctaria*," vi., 39. The specimen so labeled seems to be *Corycia vestaliata* of Guenée.

"*Macaria* ? *subapiciaria*," vi., 40. The specimen so labeled is a true *Macaria*, and is the same species as *Boarmia inordinaria* Walker, cited merely by name on the previous page.

"*Melanippa propria*," vi., 40. The specimen is *Baptia albivittata* Gueneè.

"*Coremia* ? *palparia*," vi., 40. The specimen so labeled is a species of *Bomolocha* (*Hyphen*), and evidently owes its specific name to its long palpi, so characteristic of *Hyphen*.

"*Cidaria lactispargaria*," vi., 41. This insect is a brown species of *Cymatophora* (*Boarmia*), with a white flecking on the transverse posterior line of the primaries.

"*Botys magniferalis*," vi., 41. This specimen is *Botis illabilis* Hüb.

The above species are all that are described in these two papers. The entire collection contains 193 specimens labeled as belonging to 149 species by Mr. Walker. A large proportion of the names given accord with names now accepted for the species. The following are exceptions, and it may be found here that in some instances Mr. Walker's specific names have priority.

"*Leucania insueta*." The specimens so labeled belong to *Heliothila commoides* (Gueneè).

"*Hydroecia lorea*." This is not Gueneè's species, but is *sera* of G. & R.

"*Hydroecia ligata*." This is *Hydroecia lorea* Gueneè.

"*Nonagria* ? *intractabilis*." This is *Eustrotia albidula* (Gueneè).

"*Mamestra ordinaria*." This is *Hadena devastatrix* (Brace).

"*Mamestra unicolor*." The specimen is *Agrotis clandestina* (Harris).

"*Apamea finitima*." One of the specimens so labeled is not Gueneè's species, but is *Mamestra lilacina* Harvey.

"*Apamea glaucovaria*." This specimen is *Mamestra albifusa* (Walker) of Grote's List (the same as *chenopodii* var. Speyer).

"*Homoptera contracta*" is *Homopyralis tactus* Grote.

"*Homoptera herminioides*." The specimen is in poor condition, but is clearly referable to *Epizeuxis*.

"*Plusia aerea*." This specimen is not Hübner's species, but is *P. aereoides* Grote.

"*Nephelodes signata*." The specimen is *Hydroecia semiaperta* Morr., and belongs to *Tricholita*.

"*Agrotis jaculifera*" is not Gueneè's species, but is *herilis* Grote.

- "*Calocampa vetusta*" is *Calocampa nupta* Lintner.
"Agrotis spissa" is *Agrotis messoria* Harris.
"Agrotis illata" is the species determined as *Hadena suffusca* Morr.
"Herminia concisa" is *Epizeuxis aemula* Hübn.
"Herminia cloniusalis" is *Bleptina caradrinalis* Guen.
"Herminia clitosalis" is a specimen of the same species without the black stigmata.
"Herminia n. s.?" is *Zanclognatha laevigata* Grote.
"Herminia cruralis" is not Gueneé's species, but *laevigata*.
"Bleptina surrectalis" is *Pseudoglossa lubricalis* (Geyer).
"Hormisa effusalis" is *Epizeuxis aemula* Hübn.
"Pellonia successaria" is *Haematopsis grataria* Fab.
"Balsa obliquifera" is *Nolaphana melana* (Fitch).
"Hypena cacalis" is *Scoparia centuriella*.

These determinations may prove of value in settling some of Mr. Walker's unrecognized descriptions of North American moths.

DESCRIPTION OF A NEW SPECIES OF PAMPHILA FROM COLORADO.

BY W. H. EDWARDS, COALBURGH, W. VA.

Pamphila Snowi.

Male—expands 1.1 inch.; size and shape of *Leonardus*, the hind wings somewhat less prolonged anteriorly.

Upper side of both wings light glossy brown; primaries have five translucent spots, namely, one sub-apical, oblong, narrow, cut into three equal parts by the subcostal nervules; three discal, the first being at the top of the upper median interspace, small, semi-oval; the next large, irregularly quadrate, crossing the next lower interspace, and the third on sub-median interspace, less transparent, more yellow, in one example clearly defined, sub-triangular, in the other diffuse; these three spots forming an oblique line back of and below the cell; the fifth spot is at

the outer end of the cell, a narrow transverse bar; the stigma long, narrow, a little sinuous on the middle, black, edged in the middle by rough dark brown scales on either side.

Secondaries have an abbreviated discal row of indistinct, small yellow spots, placed nearly parallel to the hind margin, and restricted to the discoidal and median interspaces, or very nearly so; in the middle of the cell a small yellowish spot, almost obsolete; fringes cinereous, those of secondaries lighter than the others.

Under side of both wings brown with a russet tint; primaries somewhat fuscous near base, in and below cell, and pale yellow in the submedian interspace; the spots repeated except the lower of the three, which is lost in the color of the interspace just mentioned; secondaries have the discal spots more distinct, yellowish, and there appear faint traces of obsolete spots which would complete the series to costal margin; the cellular spot small, distinct, rounded.

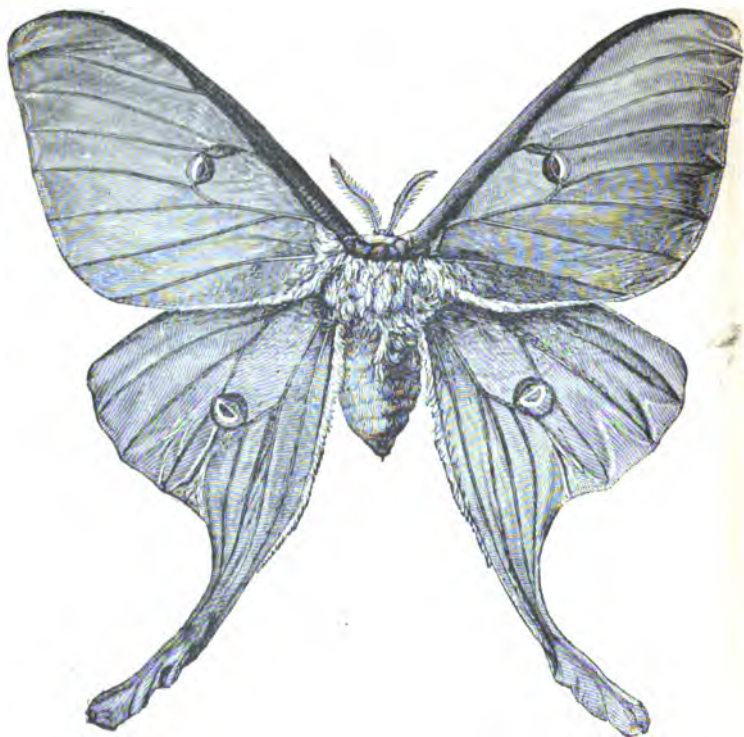
Body above brown, below the thorax gray-brown, about the collar yellow tipped; abdomen yellow-gray; legs brown; palpi sordid white, gray at tips; antennae fuscous above, grayish below; club fuscous for a narrow space on upper side, elsewhere russet.

From 2 ♂, sent me by Prof. F. H. Snow, and taken by him in Colorado, at Ute Pass, while in charge of the Kansas University Scientific Expedition, 1876. No others were taken, as I am informed.

The species is near *Leonardus*, from which it differs in not having the basal area of primaries fulvous, in not having two spots near hind margin in the discoidal interspace, in having the spots translucent instead of fulvous, and in having a distinct spot at end of cell; the stigma of *Leonardus* differs considerably also, being heavier, somewhat curved, and especially broken in on the lower median nervule, of which the posterior part is thrown back of the line of the remainder; the spots on disk of secondaries in *Leonardus* are placed as in the present species, but are larger, and either quite distinct or largely diffuse, examples varying. The under side of *Leonardus* is more red (cinnamon-brown), and the series of spots on secondaries is complete and distinct, as is also the cellular spot. In these wings the resemblance between the two species is closer than elsewhere. They form a very interesting group.

ERRATA.—On p. 6, vol. 9, second line from top, for 40° read 4°, and on p. 8, second line from bottom, for *distance* read *distinct*.

Fig. 1.



THE LUNA MOTH.

Actias luna Linn. •

THE LUNA MOTH--*Actias luna* Linn.

BY THE EDITOR.

In No. 8, Vol. 7 of our journal, there is an interesting article on this beautiful insect by Mr. R. V. Rogers, of Kingston, Ontario. When that appeared we were unable to supply an illustration of the moth, but lately we have succeeded in obtaining a very beautiful one drawn and engraved expressly for our pages.

This moth (Fig 1) measures when its wings are spread from $4\frac{3}{4}$ to $5\frac{1}{2}$ inches. The wings are of a delicate green color, thickly covered with pale hairs as they approach the body. There is a purplish brown stripe along the front margin of the fore wings, which stretches also across the thorax, while a small branch of the same is extended to the eye spot near the middle of the wing. The eye spots are transparent in the middle and margined with rings of white, yellow, blue and black. The hinder edges of the wings are bordered with purplish brown.

The head is white, while the beautifully pectinated antennæ are of a brownish tinge. The thorax and abdomen are whitish or greenish white, thickly clothed with a woolly down, the former crossed by the purplish brown stripe already mentioned. The legs are purplish brown.

This lovely creature is not at all common in the neighborhood of London; indeed it can scarcely be called common anywhere in Ontario, although it is very widely and generally distributed. Seldom a season passes without some being captured in our midst, and occasionally we have had them fly in at the windows at night, attracted apparently by the light.

The larva, which is of a bluish green color, feeds on Hickory, Walnut, Butternut, and sometimes on Beech and Oak, and closely resembles that of *polyphemus*, from which it may be distinguished by its having a pale yellow lateral stripe, bands of the same between the segments, and a brown V-shaped mark on the terminal segment.

For fuller details we refer our readers to Mr. Rogers' excellent paper.

SUPPLEMENTARY NOTES UPON ARGYNNIS MYRINA, WITH
MENTION OF THE SPECIES BELLONA, ATLANTIS
AND CYBELE.

BY W. H. EDWARDS, COALBURGH, W. VA.

I was again in the Catskills, 18th August, this season, and remained there till October. On 20th August I found *myrina* abundant, and easily obtained eggs, laid 21st. These hatched 29th. The larvæ passed 1st moult 6th Sept., 2nd moult 11th, and by 20th had become lethargic, gathering in small clusters on the leaves which I gave them. A second brood hatched 22nd Sept., from eggs laid on 8th. Time 14 days, or nearly double that of the other brood. These larvæ also reached 2nd moult and became lethargic. Still another brood I obtained a week later, and when I left the mountains these had not reached the 2nd moult, but lingered after the first. The weather was cold, and though the larvæ fed, their periods were greatly retarded. I was endeavoring to see if the latest broods of the year might not perhaps hibernate immediately after the egg, as those of *cybele* do. But I discovered nothing to lead me to conclude that such was ever the habit of this species. These last larvæ were not living when I again reached Coalburgh.

The latest female *myrina* which I saw on the wing was on 16th Sept., but not having a net with me, I was unable to take her.

Argynnis bellona was less abundant, and at first seemed extinct, but I discovered that it frequented certain spots, especially where a particular species of *Solidago* grew, showing a great partiality for the flowers; and by often visiting these places, I obtained several females. These laid about fifty eggs on violet. First eggs 23rd Aug., and they hatched 31st. The larvae passed 1st moult 6th Sept., 2nd 11th, and some of them passed the 3rd moult 20th Sept. A few days after, both those which had passed the 3rd, and the others which had stopped at the 2nd moult, became lethargic. But I had sent some larvae of same lot, in their first stage, to Miss Peart, at Philadelphia, and all of them went on to chrysalis and imago.

A second brood of *bellona* from eggs laid 31st Aug., went on to 2nd moult, and all these became lethargic; and these, as well as the others, and the larvae of *myrina*, I have here at Coalburgh.

Bellona, in all its preparatory stages, is closely like *myrina*. The egg is of the same pattern, but rather longer, and the sides are less rounded; the larvae in first stages can scarcely be distinguished; in the last the spines of second segment are not lengthened as in *myrina*.

Atlantis was abundant, but the females set on violet laid no eggs, and I found on dissection that their eggs were yet immature. On 24th Aug. I took a pair of *atlantis* in copulation. It was in the forest, five miles from home, and I tied the pair in my net and suspended it on a tree. The next day, on returning, I found the pair separated, and brought the female home and set on violet. Two days after, 28th, there appeared to be but a single egg laid. The next day I discovered another, and by the 31st she had laid about a dozen, and I compassionated her endeavors and let her fly away. I kept all these butterflies alive on sugar and apple. The eggs hatched in 17 or 18 days. At the same time, I obtained a large number of eggs from other *atlantis*, which duly hatched. All the larvae forthwith began their sleep, as do those of *cybele* and *aphrodite*, *diana* and *idalia*, and that on empty stomachs, for as a rule they eat nothing.

And inasmuch as *atlantis* deposited eggs but a few days after copulation, and *myrina* does almost immediately after, we get light on an early brood of *cybele*, &c. For Mr. C. G. Siewers, of Newport, Kentucky, wrote me last summer that he had taken two pairs of *cybele* in copulation, in July. I think it probable, therefore, that these large species are digoneutic in West Va. and the Ohio Valley. The early brood of *cybele* (butterflies) appears in great force here by 1st June, on the clover blossoms, first the males, and in a few days the females. After the 15th to 20th June, they disappear, and in July I scarcely ever see an example. By 15th August fresh males appear again, and soon after fresh females, and I can always obtain eggs between 1st and 20th Sept. Just so with *aphrodite*. I should not have doubted there being two broods were it not for the fact that the several stages of the larvae which feed in spring are so remarkably prolonged that it seemed unlikely that between 15th June and 15th Aug. the several stages of egg, larva and chrysalis could be passed; and furthermore, that I had repeatedly dissected females of *cybele* in June, and when I could obtain them, in July and first half of August, and never yet found the least appearance of a formed egg. Nothing but fatty masses to represent them. But suddenly, about the middle of August, the eggs begin to take shape, and in a week or ten days are ready to be laid. But the hot weather of July and August, the mercury constantly running

between 80° and 95° in this region, and the nights (in which these larvae principally feed) being warm, may accelerate all the preparatory stages. While the evidence from dissection is but negative, Mr. Siewer's evidence, on the contrary, is positive, and if copulation takes place, we may be pretty sure that eggs follow.

BOOK NOTICES.

The Rhyncophora of America north of Mexico, by John L. LeConte, assisted by George H. Horn. From the Proceedings of the American Philosophical Society, Vol. 15.

This work, which fills a volume of 455 pages, is probably the most important contribution which has been made to the Entomology of America for many years. Its production must have been attended with immense labor and long and careful study. In addition to the work of classifying this numerous and difficult group of insects, a very large number of new species are described. We tender our sincere thanks to the authors for their kindness in sending us a copy of this useful and long needed memoir.

Manuscript Notes from my Journal, or Illustrations of Insects Native and Foreign; Order Hemiptera, sub-order Heteroptera. By Townend Glover, Washington, D. C.

In the 12th No. of Vol. vi., we called the attention of our readers to the issue of a valuable work by the same author on Diptera. The volume now at hand on the Hemiptera is published in similar form and style, quarto on heavy paper, printed on one side only, and the text a fac-simile of the author's handwriting. In this volume there are ten excellent plates, nine of which are devoted to the illustration of the species to which the notes refer, and one to the figuring of those portions of the insects on which their classification is based. There are figures of 238 species, many of the smaller ones in duplicate, one showing the insect magnified, the other of the natural size. In addition to the plates and their explanatory matter, there are 134 pages of text, 2 explanatory, 17 devoted to the classification of the Hemiptera, and the remainder to notes on the insects

themselves, their habits, the animal and vegetable substances they injure, the remedies used for destroying them, &c., all being referred to in alphabetical order.

This work is another evidence of the indomitable perseverance of this energetic Entomologist, and will be a valuable aid to those who desire to study this hitherto much neglected order. The author has again placed us under deep obligation for his kind remembrance of us.

Report on Insects Introduced by means of the International Exhibition, by Dr. J. L. LeConte, Dr. Geo. H. Horn, and Prof. J. Leidy. From the Proceedings of the Academy of Natural Sciences, Philadelphia, pp. 5.

We are glad to learn from the report of this committee that the insect pests observed among the grains, seeds, &c., exhibited, are chiefly such as are already known among us, and that there is not much likelihood of any great injury resulting to any agricultural product from the introduction of new enemies from this source.

The Rocky Mountain Locust; being report of proceedings of a conference of the Governors of several western States and Territories, together with several other gentlemen, held at Omaha, Oct., 1876, 8vo., pp. 58.

We are indebted to our esteemed friend, C. V. Riley, for a copy of the above pamphlet, which contains much valuable information on the habits of this destructive pest, as well as a summary of the best means yet known for counteracting its ravages.

Life Histories of the Birds of Eastern Pennsylvania, by Thomas G. Gentry, Vol. 1.

This is an octavo volume of 394 pages, published by the author, who resides in Germantown, Philadelphia. It is a thoroughly practical work, dealing largely with the habits of the various species of birds as observed by the author, who describes their nests and eggs, gives very full and explicit information in reference to the character of their food, the results of careful and repeated observation in the fields and woods. It is this feature that lends a special charm to this interesting little book, which is written in a very pleasing style and supplies a want long felt. We heartily commend it to all our readers who are in any way interested in Ornithology. The 2nd volume, which will complete the work, will be issued shortly, and may be obtained from the Naturalists' Agency, Salem, Mass.

CORRESPONDENCE.

DEAR SIR,—

Mr. Behrens (*p. 200, Vol. 8*) writes : “ Mr. V. T. Chambers is satisfied to get Tineidæ dead and dry, and even untouched by a pin.” “ Satisfied ” in this connection is almost too strong a word, and may be misleading. So a distinguished Lepidopterist of Europe has made an objection to my work on the ground that I only keep specimens packed in cotton, and that, unpacking them, I place them under a microscope and prepare my descriptions from the appearances thus presented. This statement, like the preceding by Mr. Behrens, comes from a misapprehension of the facts. I prefer always to have some of my specimens on pins and some of them with the wings spread. It is best to study them pinned and not pinned, spread and not spread. When the opportunity offers, I prefer in the first place to observe them closely alive, before I take them, and when the quantity of material suffices, I also examine them both spread and not spread after they are dead, with the eye, a simple lens, or a compound microscope, according to circumstances. Indeed, in by far the greater number of new species described by me, the insects have been examined not only in the conditions above mentioned, but have also been dissected ; as is evident not only from the published accounts of the neururation of the wings, but much more by the multitude of drawings of the neururation now in my possession. All of my Tineina from Texas and from Canada, and nearly all that I have received from Miss Murtfeldt, from St. Louis, have come pinned and spread. Mr. Behrens wrote to me that he preferred not to undertake the task of pinning these little things, and besides he had not time, and I replied that I would be glad to get them packed in cotton without pinning ; and all of his specimens have been sent in this way. I have also received a few specimens from one or two other Entomological friends in the same condition. This mode, however, does not answer for sending Tineina for any considerable distance. The antennæ, palpi and tufts of scales on the wings or elsewhere are almost invariably rubbed off, and the insect is otherwise worn and denuded, so that I have not attempted to describe one specimen in ten that has been received in this condition. This plan, or rather a modification of it, answers better for preserving Micros taken at home, and which do not have to be shipped. Of the greater number of my Tineina I have not attempted the preservation of many specimens at a time. Making but few exchanges, I have kept but very few for that pur-

pose, and for my own use, after using a sufficient number and in various conditions for generic and specific diagnosis, I have contented myself with keeping a few, not *packed* in cotton, but simply laid on a loose tuft of cotton, in a pill box, which being set away in the cabinet, the insect remains as perfect as when first placed there. Such specimens, if needed for future observation, I take by the legs in the stage forceps of the microscope, and they are in good condition for observation either under the microscope or without it, as they may by means of the forceps be conveniently turned and handled without danger of breaking them, and every part of the insect may be well observed unless—as sometimes happens—the wings are so perfectly closed as to conceal the upper surface of the abdomen. But these are simply specimens preserved for future reference. A few specimens of *very* rare species I have not attempted to pin and set because of the danger of injury to such rare species. A few others of the smallest species (as e. g., some *Nepticulæ*) I have treated in the same way, because of the certainty of injury, if not of absolute destruction, in the attempt to pin them. But in other cases my descriptions have been prepared from observations of numerous specimens in various conditions as to preparation. I have found the species which I have described from this locality very numerous, so that a morning's ramble any day from May 1st to November 1st will supply me with specimens of fifty species, and half a bushel of mined leaves. I have, therefore, not felt the necessity of preserving pinned specimens of such species. Indeed, some years ago I seldom took the trouble to pin and spread common species at all. In a series of specimens the wings of some would be found in one position, some in another, or more frequently I would separate the wings entirely from the body. But a few years ago I began to make a collection to be preserved as types of all my species. These were all pinned and spread. Unfortunately, during my absence in Colorado, the greater part of this collection was destroyed. One or more specimens of the greater number of species were fortunately preserved, and most of the other species can be supplied. This collection is now in the Cambridge Museum. It contains types—pinned and spread—of something over 200 species.

There are, however, serious objections to pinning and spreading many Tineina. Very few persons are able to make a good "mount" of the small species; it is well nigh impossible to do it without *some* denudation, and an amount of it which could not be appreciated in a larger moth, is ruinous in one of these little things. Many species are characterized by

tufts of raised scales, which are very likely to be removed in the attempt to mount them ; and frequently the distinguishing specific characters are to be found either on the extreme margins of the wings, or in the apical ciliæ, just where they are most likely to be removed or injured in pinning ; the thorax, of course, is destroyed in small species. It is therefore best to make very careful observations before attempting to pin a "Micro." If a species is very rare, so that I desire to keep the specimen, I should want it pinned and spread ; but if it was unique and small I should not run the risk. And when one keeps a cabinet of pretty curiosities, of course they are best pinned and spread. But for the purpose alone of scientific study or description, I would prefer the untouched insect, and except for the preservation of types, would deem pinning unnecessary.

V. T. CHAMBERS, Covington, Ky.

NOTES ON HYBERNATING BUTTERFLIES.

In No. 4, Vol. 7, of *Psyche*, Mr. Scudder gives some notes on early spring butterflies at the White Mountains, noticed during June 2nd to 5th. Speaking of *Vanessa F-album*, he says : " One or two specimens only were seen on the 4th, apparently just out of winter quarters ; they appear later I believe than other hybernating *Praefecti*, and those seen were on the sunny side of a barn which had probably served as their winter refuge."

In this locality, as elsewhere, *V. antiopa* is the first butterfly seen in spring, but as far as my experience goes, *F-album* appears as early as *milberti* and the *Graptas* ; I am not sure about *P. cardui* and *huntera*. Referring to my note book, I find the following dates for *F-album* : April 18th, 1874, one specimen observed ; April 26th, 1874, a pair taken in *coitu* ; May 14th, 1876—cold, late spring—a specimen taken at willow blossoms. *Antiopa* makes its appearance here as soon as the snow has melted off sheltered spots on the south-western slopes of Montreal Mountain. The earliest record I have of its appearance is April 4th, 1875 ; on that date I saw a specimen on the wing and found two others under a stone. *Antiopa* can be found under stones, on dry sunny slopes with scattered trees, every spring, but I never met with any other species in its winter quarters. Do they hybernate in places less exposed to the influence of the early spring sunshine ? If so, may not this account for their appearing a week or two later than *antiopa* ?

F. B. CAULFIELD, Montreal, P. Q.

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METAMORPHIC CHANGES OF PLATYSAMIA CECROPIA.

BY THOMAS G. GENTRY, PHILADELPHIA, PA.

In the early part of May, 1876, I secured a newly-developed female moth of the above species to a branch of the common red currant (*Ribes rubrum*). It was about seven o'clock in the evening of May 6th, to be more precise in regard to time. On the next morning, I visited the spot, and a lusty male was discovered in coition. This condition of things continued until the close of the day, when her amorous partner, lured by the presence of dusky night and midnight revels, gradually loosened his embrace, and hied him away to other scenes. During the night some fifty eggs had been laid, which continued to be deposited at intervals during the succeeding day, until the number had reached about seventy. These eggs were not arranged with any view to order, but were agglutinated in masses to the reposing surfaces, or appeared in small isolated patches.

They were beautifully elliptical in contour, and measured one-eighth of an inch in length, and one-twelfth in width. The thickness was about one half the width. They were yellowish-white in color, and thickly coated with a brown viscid secretion.

These eggs did not hatch until June 3rd. Another batch was laid by a second female on the night of May 9th, which hatched on the same day as the first. A third lot by another female was deposited on the 22nd of the same month, which hatched on the 6th of June, just three days after the first and second lots. During favorable weather I have known the eggs of *cecropia* to develop in six days. This being the case, it is evident that the necessary conditions were wanting in the above-cited instances. A temperature ranging from 80 to 90 degrees of Fahrenheit thermometer, and a comparative freedom from undue atmospheric moisture, are essential conditions.

At the time when the above deposits were made, the weather was more or less cloudy, and both light and heavy rains were of frequent occurrence. Such was its unfavorableness, that fears were entertained of the complete failure of my experiments. On many occasions, eggs were broken, and their contents examined with very strong magnifying glasses, to ascertain whether putridity had taken place. Within a week of the time of hatching, numerous eggs were examined, and the only evidence of change apparent, was a slight turbidity of their contents. The weather for a day or two previous had been exceedingly fine, and the heat rather powerful. This happy state of things continued with slight, unimportant changes, until the hatching process was over. Eggs, as well as chrysalids, can endure a strong degree of cold without injurious effects, provided transformation has not already commenced, when vitality receives a check from which it never recovers. An alternation of wet and dry, or of extremely cold and very warm weather, is exceedingly detrimental. May it not be that the extreme paucity of certain kinds of insects during some years is due to the causes which have just been noticed?

The caterpillar of this species (when hatched) is nearly three-sixteenths of an inch in length, and scarcely thicker than an ordinary darning-needle. Its general color is a jet black. It is armed with two dorsal rows of glossy black spiniferous tubercles, those on the second and third somites being the largest; and also two lateral rows on each side, making six in all. The antennæ are short, black, triple-jointed, and moderately tapering. The true legs are black, three-jointed, and armed with short, in-curved claws; the pro-legs occupy the 6th, 7th, 8th, 9th, 10th and anal segments, and are furnished with a double row of black cilia.

June 10th—First moulting takes place. The caterpillar now measures nearly one-half of an inch. At first, it is greenish-yellow, but gradually changes to a yellowish-brown, with a slight tinge of green when perfectly dry. The caput and star-crowned protuberances still remain a beautiful glossy black. Each somite, between the different rows of tubercles, is diversified with a pair of black spots which ultimately become conjoined, forming longitudinal lines throughout their entire length. Between the segments, they are continued as obscure bands.

With age, the color becomes a dark yellowish-brown. At this stage, the caterpillar ceases to feed, and becomes considerably shortened. It is

now perfectly inactive, and behaves as if dangerously ill. This state of things lasts for a couple of days, during which time the larva has completely changed its skin, and gathered strength for future labor.

On thrifty plants of the red currant growing in the sunlight, development is very rapid; whereas, caterpillars feeding upon plants growing in the shade, exhibit the most remarkable contrasts, even in the same brood. The latter are more slender, being one-eighth of an inch shorter, darker, and have olive-green constrictions. The head and tubercles are an obscure black; the body bands much darker. From careful watching I am satisfied that they pass into their next stage without the necessity of moulting.

June 18th—The caterpillar has changed its skin again. It now measures from seven-eighths to one inch in length. The time of changing apparently varies from five to eight days, depending upon individual vigor.

The general color, at first, is a light yellowish-green. The tubercles of the first somite have each a dark basal annulus, and a pale blue summit which is surmounted by seven black spines, six in a circle and the remaining one occupying an apical position, from which it projects either vertically or obliquely; the remaining tubercles upon the first segment are jet black, and furnished with six spines. The second and third series of dorsal tubercles are a deep flesh color, with spines similar in number and position to the foregoing. The 4th, 5th, 6th, 7th, 8th, 9th and 10th somites have lemon-colored tubercles, with black, longitudinal dashes, facing laterally; and the 11th segment is armed with one large tubercle, occupying a median dorsal position, which is surrounded by a circle of seven spines near the middle, and overlooked by two divergent terminal ones.

The lateral tubercles of the 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th, 10th and 11th segments, are glistening and bluish. The 2nd and 3rd are armed with six encircling spines, and one apical; while the others, with five, and, sometimes, six encircling spines. Each tubercle is marked with longitudinal dashes on both sides, or merely on the dorsal side. The 12th segment has four light blue tubercles, armed with six spines. Above the anal pro-legs, two light blue tubercles are visible, which are furnished with six black glossy spines in a circle, and two broad lateral dashes.

The four abdominal pro-legs have each a broad, irregular, quadrangular black patch, near the distal extremity, and a small semi-elliptical one near

the proximal end. The anal pro-leg on each side has two long, broad, oblique bands, inclining anteriorly.

The median dorsal line is marked with black dots which are arranged as follows : 3rd segment, posteriorly, a small dot ; 4th, two very small dots ; 5th, 6th, 7th, 8th, 9th and 10th segments, both fore and aft, two large jet black dots.

Between the dorsal and lateral tubercles, the arrangement is as follows : 1st segment, one linear, transverse dash, posteriorly ; 2nd to 10th inclusive, both fore and aft, each two nearly circular dashes ; 11th, one posterior dash.

Above the sub-lateral tubercles, exists another row. The 2nd and 3rd segments have each one in front ; 4th to 11th inclusive, each one small dot in front of a larger one. Below this row, between the pro-legs, there is also a small dot on each of the several segments.

Each of the 1st, 2nd, 3rd, 4th and 5th segments, below the sub-lateral row of tubercles, bears a single jet black tubercle, which is armed with a single spine, or a pair of divergent, similarly colored spines.

The true legs are black, conical, 3-jointed, and armed with a single black incurved claw. The pro-legs, with a semi-circular row of black ciliæ, inwardly.

The head is lemon-colored, with two black, irregularly elliptical spots anteriorly, resembling eyes, which have a small triangular shield between them. There are also two smaller spots near the proximal end of the 3-jointed, conical antennæ. The basal joint of the latter organ is sub-truncate and lemon-colored ; middle, small, cylindrical, and concolorous ; and apical, setiform, hairy, and blackish. Upper lip, bi-labiate, greenish, and black on margin. Jaws and lower lip similarly colored with the upper lip ; palpi, 3-jointed, each joint being dark brown, with a greenish annulus near their lines of union.

Before moulting, the caterpillar assumes a bluish-green color. The dots of the dorsal row become smaller, the posterior dots, partially or entirely, disappearing. The tubercles upon the first segment become a jet black ; dorsal tubercles upon the 2nd and 3rd segments, a reddish purple ; lateral pair, a glossy black with bluish tinge at apex ; and the others, a beautiful black. The remaining dorsal tubercles are deep yellow, and have broad black patches on the sides, which are confluent posteriorly in certain cases. Lateral tubercles, black on the inferior two-thirds, and

bluish above. Sub-lateral, jet black, with pale blue apices. The dots between the dorsal and lateral rows of tubercles are much smaller than formerly, and have actually disappeared in several instances. Between the lateral and sub-lateral rows they are nearly gone in front, and entirely so behind. Upon the abdominal pro-legs they are broader below, and rapidly diminishing above. On the anal pro-legs, the two confluent spots have separated and grown elliptical in shape. That upon the head is somewhat longer and broader.

The jaws, lips and palpi have become more conspicuously colored, approaching the color of these parts in the mature caterpillar.

The spiracles, which all along occupied a middle lateral position on the 1st, 3rd, 4th, 5th, 6th, 7th, 8th, 9th, 10th and 11th somites, but, without being easily recognized from resemblance in color to surrounding parts, are now quite conspicuous. They are narrowly elliptical in contour, with the longest diameter arranged transversely, and have cream-colored centres with black borders.

The general color of the caterpillar upon the inferior surface, is a bluish green, with obscure patches of black between the segments. Along the middle of the dorsum, extends an obscure bluish band from the head almost to the last segment.

The caterpillars, at this stage, vary considerably in the time of moulting. Some reach this period much sooner than others, at least two days earlier, even in the same brood. It is the thrifty-looking caterpillars that are thus favored. The ill-favored ones contrast quite remarkably with the latter, in size, color and markings. A number of caterpillars was purposely confined to a bush of the red currant, whose leaves were small and sickly-looking. They thrived poorly, increasing but slowly in size, while their more fortunate companions of the same brood fairly outstripped them in size and vigor, and actually passed through an entire transformation in advance of them. At the start, they had no advantage over their brethren; all were favored alike. What could have wrought the difference? From the foregoing facts, the conclusion is irresistible that nutrition had been the force at work; the vigorous larvæ, being amply supplied with food of the very best quality, had rapidly added to their size; while their stunted companions, being supplied with plenty of innutritious diet, had remained almost stationary.

June 26th—The caterpillar has moulted for the third time. Its length

is one and three-fourth inches, and thickness nearly one-half an inch. The color of the middle dorsal line is bluish-green, and of the lateral walls, a beautiful pea-green. The dorsal and lateral dots and blotches have entirely disappeared, as well as those upon the pro-legs and spine-bearing tubercles.

The tubercles upon the 1st segment are a light blue, bordering upon pearl; concolorous with those upon the lateral and sub-lateral abdominal rows. Their spines still retain the primary black. The 2nd and 3rd segments have dark purple tubercles above, while the 4th, 5th, 6th, 7th, 8th, 9th and 10th pairs of dorsal tubercles, are a deep lemon. The 11th segment has one large central tubercle, equal in size to those upon the 2nd and 3rd segments, which are larger than the others. The 12th and 13th dorsals are a pale blue.

The pro-legs and true legs are yellowish green, except the lower part of the distal joints of the latter, which are similarly colored with the claws.

Upon each side of the caput, near the base of antennæ, are two dark spots. General color of head, pea-green; mouth appendages, light blue.

The under surface of the caterpillar is a light green.

July 4th—The last moulting occurs. The length is two and one-half inches, and the thickness one-half an inch. As soon as the skin is changed, the dorsal tubercles of the 2nd and 3rd segments, are yellowish brown, with a lower circle of eight black papillæ without spines, and a circle of six spines above, surrounding a central one. Fourth pair of dorsal tubercles yellow, with eight black warts near the base, and a circle of six black spinules above, surrounding a central terminal one; 6th, 7th, 8th, 9th and 10th each with two horizontal spines; 5th, with five spines arranged in the form of a pentagon; 11th, yellow, with a circle of six spines, near the base of which, anteriorly, are several irregular black blotches.

On the anterior margin of the 1st segment, in line with the dorsal tubercles, exist four blue wart-like prominences.

The 2nd and 3rd lateral tubercles are light blue, each furnished with a circle of six spines, surmounted by a central spine; 4th, a circle of four and one central; 5th, 6th, 7th, 8th, 9th and 10th, blue, with one central spine.

Sub-lateral tubercles, below spiracles, same size as the laterals, hairy, 2-spined, with rudiments of a second pair in some cases. Below these,

on the 2nd, 3rd, 4th and 5th segments, exist small blue tubercles tipped with double spines. On the 12th segment, alternating with dorsal and lateral rows, there are four blue tubercles, with a circle of six black spots near their base, and a circle of four spines and one central on the dorsal tubercles, and a circle of four spines on the laterals. In line with the dorsals, two blue tubercles with five black spines, two of which in some cases have nearly disappeared.

True legs, greenish yellow, with black incurved claws; pro-legs, greenish-yellow.

Spiracles narrowly elliptical, with pearly centres and black margins.

Antennæ, cream-colored, tipped with brownish, and having two dark kidney-shaped spots near their base. Upper lip, pearl-colored and deeply cleft; lower lip, similarly colored; palpi, short, hairy, and marked with dark brown blotches; jaws, pearly at base, and dark brown for the anterior two-thirds.

General color above, greenish blue; on the sides, pea-green, and of the same color below.

In many cases, the lateral and sub-lateral tubercles are a beautiful pearl color, which appears to be due to the character of the food, for it is a noticeable fact that the majority of the caterpillars which exhibit this color-change, are found feeding upon the leaves of the common plum (*Prunus domestica*).

July 21st—The larvæ commence to spin their cocoons. This requires a period ranging from three to four days. While the operation is in progress, a slight incision is made through a cocoon, which is instantly repaired. Three times is the experiment performed, and as many times is the cocoon mended. But the fourth time the caterpillar seems to take no notice of the rent, or, even if it does, it is unable to make good the damage by reason of the lack of necessary material. The cocoon being completed, the remaining efforts of the larva are spent in the rupture and separation of the epidermis, which is eventually thrust into the lower part of the cocoon. This is effected in about six days. The process is precisely similar to that which takes place in moulting.

Caterpillars in confinement, particularly in empty boxes, become exceedingly restless, and wander about for several days, as if in quest of something. This is especially noticeable in larvæ which utilize the leaves of the plants upon which they feed for cocoon purposes. Where the box

is small, and both the upper and lower surfaces are perfectly accessible, the absence of leaves is but little missed. But, on the other hand, where these substitutes do not exist, the chrysalis has been known to appear without the customary covering.

This fact seems to point to the conclusion that the cocoon is only a subsequent acquirement, which did not primarily exist. In climates where rains are of common occurrence, as protecting envelopes, they are indispensable. A chrysalis will endure a very low temperature while comparatively passive, with perfect impunity; but cannot endure excessive moisture without destruction.

Of the exact time which the chrysalis requires to develop into the imago, I can only say that it depends upon thermometric conditions; were the several larval transformations undergone in early summer, while the mercury is standing at 92 degrees, and were the chrysalis stage then assumed, it is probable that the moth would appear in about two weeks. We reason from analogy. *Actias luna* requires but a single day less than a fortnight to pass from the condition of pupa to that of imago, and surely *cecropia* could scarcely surpass this period. Cocoons that have been taken into the house in August, and kept close to a hot stove, have developed in January; while those which have been left out doors, seldom change before the middle of May. As far as I have been able to ascertain, this species is single-brooded.

Before bringing this sketch to a close, there are a few particulars which I shall touch upon, that came under my immediate notice during the season that has passed. It is a mistaken impression that caterpillars of particular species confine their feeding to certain plant-species, exclusively. During several years past, I have closely looked into this subject, and my experience has been otherwise. My observations upon *cecropia* have been both interesting and remarkable. In the neighborhood of Germantown, the leaves of the common red currant, constitute its favorite food. During the first and second stages, by which I mean the intervals before and after the first moulting, it entirely restricts its feeding thereto. But after the second moulting, it readily accustoms itself to *Ribes nigrum*, *R. grossularia*, *Prunus cerasus*, *P. vulgaris*, *Rosa blanda* and *Spiræa corymbosa*. A little later, I have tried numerous larvæ upon *Wistaria sinensis*, *Philadelphus inodorus*, *Syringa vulgaris* and *Prunus serotina*, with remarkable success. Subsequent to the last moulting, several caterpillars were induced to feed upon *Symphoricarpus racemosus*. Some cocoons which were produced by

larvæ reared upon the leaves of *Sambucus Canadensis*, are the largest that I have ever seen. They measure fully four and a half inches in length, and have a diameter of nearly three inches. They are less compact than those found upon any of the foregoing plants, being very light and considerably inflated. The chrysalis within is proportionally large. In some parts of the country, along the borders of thickets and waste fields, they are found in abundance, and thrive handsomely upon the elder. The moulting periods are shorter, and the chrysalis stage is attained at least a fortnight sooner than is usual. At first, where plants more congenial to the taste, are in close proximity, a disposition to stray thereto was discernible. To obviate this difficulty, perfectly isolated plants were selected, which proved highly successful. Frequent attempts to rear caterpillars before the first moulting was over, upon foreign plants, proved in every case an utter failure. It is doubtless true that instinct has much to do in the matter, but may it not be that the jaws and legs are so constructed at first as to be only adapted to cutting and holding on to the leaves of particular plant-species? This being so, with the further development of these organs, would certainly come the power of adaptability to take advantage of the changes thus introduced into their environment.

The food has certainly much to do with the color of the cocoon. Caterpillars feeding upon the leaves of the common red currant, produce silk of a deep reddish-brown color; while the leaves of the cherry, plum, and the several species of *Rosa*, give a light brown color, bordering on gray. Cocoons taken from *Spiræa*, *Symphoricarpus* and *Prunus serotina*, are invariably a grayish-brown. There is also plainly noticeable in caterpillars feeding upon these plants, with the exception of those feeding upon *Ribes rubrum*, a tendency to lighter colors, which in some cases is decidedly marked, as in the case of those feeding upon the leaves of *Prunus domestica*, where the lateral tubercles often display a beautiful pearl color.

That food has certainly much to do in determining the sexes among Lepidoptera, I think has been clearly shown in the writings of Mrs. Treat, and in those of the author, although leading authorities are disposed to think differently. But, notwithstanding their opinions to the contrary, I cannot be deterred from placing upon record my experience of the past summer with *Platysamia cecropia*. As before remarked, quite a number of caterpillars were constrained to feed upon the leaves of plants that betrayed anything but a healthy appearance. It has been already shown that

these larvæ were readily distinguished from their vigorous brethren in many particulars, such as size, color and markings. And, further, that in some cases growth was delayed, and even the time of moulting more than doubled; while, in others, either the first or second moulting was entirely dispensed with. An examination of their chrysalids reveals the startling fact that out of some twenty in my possession, all, with two exceptions, are masculine in character.

The question is often asked—Are there any checks to the undue multiplication of *cecropia* in the shape of natural enemies? I answer in the affirmative. Certain species of *aves* prey upon them. But no enemies are more destructive than two of our commonest species of spiders, *Tegenaria medicinalis* and *Agelena nœvia*, the former of which constructs its web upon bushes of the red currant, using a curled leaf for a tube. I have noticed the above species on numerous occasions engaged in dragging caterpillars into its dens. It is only while the caterpillars are young, before the first moulting has taken place, that these attacks are ventured upon. *Dermestes lardarius*, in the larval state, frequently attacks the living chrysalis when divested of its cocoon, and does not cease from its ravages until it has reduced it to a mere hull. Even the chitinous covering shares the fate of the softer parts within. In a few instances, these larvæ had penetrated the only door of entrance, by gnawing their way through the comparatively loose fibres of silk which occupy the centre of the basal extremity. Their presence was only detected by the removal of the cocoon. Several cocoons which I have in a warm room have recently yielded fine specimens of the following parasites: *Ophion macrum* Linn., *Exorista militaris* Walsh, *Chalcis maria* Riley, and *Cryptus nuncius* Say—the *extrematis* of Cresson. At least one out of every three which I raised during the past season, and the number was not short of two hundred specimens, has been infested.

THE NATURALISTS' DIRECTORY.—This pamphlet, recently issued, will prove a great convenience to all those interested in science. It contains the names of Naturalists, Chemists, Physicists, and Meteorologists, arranged alphabetically, the several departments separately indexed. It is well printed and interleaved with blank paper, on which additional names may be written. It is published by the Naturalists' Agency, Salem, Mass.

HISTORY OF PHYCIODES THAROS, A POLYMORPHIC BUTTERFLY.

BY W. H. EDWARDS, COALBURGH, W. VA.

(Continued from Page 10.)

I have had upwards of 500 examples of the species before me in making these comparisons, most of them bred, but many taken in the field during several years past, since my attention has been attracted to the variation manifested. Many others I have brought together from localities as far apart as those mentioned. And I can well corroborate the words of Drury, applied to *tharos*, now more than an hundred years ago: "In short, Nature forms such a variety of this species that it is difficult to set bounds, or to know all that belongs to it."

In most of the comparisons above made I have used the under side of the hind wings only, for the reason that here the markings are most decided and colors most varied; but there are differences in the fore wings also corresponding much with the others. On the upper side there is more uniformity throughout the species; but, as a rule, the winter form has the fulvous portions deep red, while in the summer generations the fulvous is usually paler, and often partly replaced by yellow, as before mentioned. The 1st summer generation at Coalburgh had much less of this change in the fulvous portions than the 2nd, and the 2nd corresponded in this respect with the 1st Catskill summer generation. But the upper side of var. A forms an exception, the black being paler, almost gray, and the hind margin of fore wing edged by a narrow band which is distinctly separated from the blacker submarginal patches. Usually these are confluent and concolored with the band, making in effect a very broad black margin. The blackish net work about the base is very open, the lines fine. A appears to be an offset of B in the direction most remote from the summer form, just as in *Papilio ajax*, the var. *Walshii* is on the farther side of *telamonides*, remote from the summer form *marcellus*. On the contrary, var. C leads from B through D directly to the summer form. A is farther from this last in all respects than are several species of this genus, and were it not for the intermediate grades, I do not think it would be suspected of any close relationship to the summer form. Variety B I conceive to be nearest the primitive type. Besides that this has appeared

constantly in the butterflies changed by cold, as related, it is common in this region, predominating over the other varieties. It is also found more or less as far north as New York, though there it is not common. And moreover, its distinctive peculiarity of color is seen in the allied species *phaon*, inhabiting the Gulf States, and in *vesta*, Texas, which in some degree replace *tharos* in those regions. Both these are seasonally dimorphic, and both are restricted in the winter form, so far as I can learn, to the single phase denoted by B in *tharos*. And in their summer generations, both have a close resemblance to the summer *tharos*, though owing to the increased number of summer generations in the extreme south, permitted by the length of the season, there are phases of the summer form in these species not observable in higher latitudes. It is noteworthy that these two species, the only ones, excepting *Batesii*, on the Atlantic slope especially near to *tharos* (and what *Batesii* is, whether it is not another variety of the winter form of *tharos*, is not yet settled), should be seasonally dimorphic, while of the many other species of the genus belonging to our fauna, not one, so far as is known, shows any marked difference between its winter and summer generation.

The significance of these phenomena I take to be this: when *phaon* and *vesta* and *tharos* were as yet only varieties of one species, the sole coloration was similar to that now common to the three. As they gradually became permanent, or in other words, as these varieties became species, *tharos* was giving rise to several sub-varieties, some of them in time to become distinct and well marked, while the other two, *phaon* and *vesta*, remained constant. As the climate moderated and the summer became longer, each species came to have a summer generation; and in these the resemblance of blood-relationship is still manifest. As the winter generations of each species had been much alike, so the summer generations sprung from them were much alike.

And if we consider the metropolis of the species *tharos*, or perhaps the parent species back of that, at the time when it had but one annual generation, to have been somewhere between 37° and 40° on the Atlantic slope, and within which limits all the varieties and sub-varieties of both winter and summer forms of *tharos* are now found in amazing luxuriance, we can see how it is possible, as the glacial cold receded, that only part of the varieties of the winter form might spread to the northward, and but one of them at last reach the sub-boreal regions, and hold possession to this day as the sole representative of the species. And at a very early

period the primary form, together with *phaon* and *vesta*, had made its way southward, where all three are found now, and neither of them, so far as appears, having developed any marked varieties of the winter form.

[After this paper was written, and the first part of it in type, I received from Mr. Boll a fine series of *tharos*, *phaon* and *vesta*, from Texas, with the dates of capture accompanying each example. It appears that *tharos* there flies from February to November, and there must be in all six or seven generations during this period. Five of these are represented in the series sent. All the examples of *tharos* are of small size, resembling in this respect those from the far north. All, except the February examples, which are var. B winter form, are very dark above, the black intense and the fulvous deep red, and some of the males have the under side of the hind wings almost deprived of markings of any sort, and to a considerably greater degree than I have observed in more northern examples. But certain males labeled Sept., Oct., resemble surprisingly var. C of the winter form. I find the first of these phases, that of the plain wing, also in *phaon*, and among the examples of this species is a female labeled November, that is undoubtedly the winter form, var. B, and which would be expected to appear in February, after the winter. And this has led me to suspect, considering the effect produced on the Coalburgh larvæ fed in the Catskills, as before related, that a cool season during the time the fall brood is feeding, or a few cool days after the chrysalis is formed, may tend to change the form of such of the butterflies as will emerge before winter, so that they shall not differ from those which pass the winter in chrysalis and appear in February. That may happen naturally which was brought about artificially with the Coalburgh brood spoken of.

I have also received a letter from Dr. Weismann of 16th Nov., 1876, which by his permission I may give in this connection: "Naturally your experiments with *tharos* have greatly interested me. The case seems to me perfectly intelligible; *marcia* is the old, primary form of the species, in the glacial period the only one. *Tharos* is the secondary form, having arisen in the course of many generations through the gradually working influence of summer heat. In your experiments cold has caused the summer generation to revert to the primary form. The reverting which occurred was complete in the females, but not in all the males! This proves, as it appears to me, that the males are changed or affected more strongly by the heat of summer than the females. The secondary form

has a stronger constitution in the males than in the females. As I read your letter, it at once occurred to me whether in the spring there would not appear some males which were not pure *marcia*, but were of the summer form, or nearly resembling it; but when I reached the conclusion of your letter I found that you especially mentioned that this was so! And I was reminded that the same thing is observable in *V. levana*, though in a less striking degree. If we treated the summer brood of *levana* with ice many more females than males would revert to the winter form. This sex is more conservative than the male—slower to change.”]

I am at a disadvantage with this paper not to be able to give colored illustrations of the different forms of *tharos*, with the variations, as well as figures of the allied species mentioned, but I propose to do so fully in the Butterflies of North America.

It is the female of the summer form, and that variety of it which displays the brown discal patch on the under side of the hind wings, that Drury figured as *tharos*, in 1770, and exceedingly well. In some notes when the description of *marcia* was given, Trans. Am. Ent. Soc., vol. 2, p. 207, I discredited *tharos* of Drury, but wrongly, and for the reason that I had not seen the peculiar phase figured. It pleases me now to make correction. My description of *marcia* was based on the first three of the varieties designated in this paper. The 4th, D, I then knew nothing of, nor indeed should I ever have noticed it but for having bred it from the egg.

Cramer's *tharos* is stated to have come from New York, and reference is made in the text to Drury. The figures are coarsely drawn and rudely colored. Bois.-Lec. state this *tharos* to be identical with Drury's, but in his Lep. de la Californie, Dr. Boisduval says it is another insect, and he considers Drury's *tharos* not to be our Atlantic species, but a Californian which he calls *pulchella*. I received the type of *pulchella* from Dr. Boisduval, and it proved to be *mylitta* Edw., a species by no means so near *tharos* as is *pratensis* Behr, of California. *Coccyta* Cramer, ♂, fig. A, B, pl. 101, is *tharos* ♂ of the summer form, and fig. C probably is intended for female of same, but the text refers it to Surinam, and it is given with a doubt as to whether it belongs to the male figured or not. Mr. Scudder regards these as var. of *tharos* Drury. But Dr. Boisduval makes it synonymous with *morpheus* Fab., and locates it in So. California. And Mr. Butler, Cat. Fab. Lep., makes *morpheus* Fab. a syn. of *liriopæ* Cramer, and refers it to Florida. And Mr. Scudder rejects *liriopæ* as N.

Am. So that the synonymy is rather mixed, and I give the above as a sample of the difficulties caused by attempts at utilizing the illy-executed figures and indifferent descriptions of some of these old books.

However, Fabricius (Ent. Syst. 3, No. 479) describes *morpheus* as a N. Am. insect, and in language, which though brief, is applicable to the summer form of what for many years has been known as *tharos*. Parvus. Alae omnes integerrimae, fulvae, maculis margineque nigris. Posticae punctis sex nigris in strigam dispositis versus marginem posticum. Subtus anticae fulvae, nigro maculatae, posticae pallascentes strigis undatis, margine punctisque sex fuscis. And accordingly, as it is best to designate by name the dimorphic forms of any species, I call the entire species *tharos*, the summer form var. *morpheus* Fab., the winter form var. *marcia*, and take no heed of Cramer's figures.

The figures of the male *tharos* in Bois. and Lec., are not very exact either, but may be taken to represent the var. *morpheus*. But the female must have been drawn from *Batesii*, and evidently Dr. Boisduval had this insect before him when he wrote these words: "We possess individuals which we consider as varieties, of which the primaries are black, with some fulvous spots and a transverse macular band of the same color. The hind wings do not differ, *except that the lines on the basal area run together.* Beneath, *the hind wings are wholly deprived of a brown border; the fore wings have likewise a part of the border effaced, but that which remains is blacker than in ordinary individuals.*" An excellent description of *Batesii*.

My experiments have thrown no light on the position or history of *Batesii*, and inasmuch as this is certainly a winter form (though I am not yet able to say that it may not be a summer form also), and the only larvæ of *tharos* so far carried through the winter having been from the Catskills, where *Batesii* is never taken, I could not expect this last to appear among the resulting butterflies, even if it were only a variety of *tharos*. If I succeed in saving the hibernating larvae which I now have, most of which originated at Coalburgh, the point as to relationship of these species, or forms, may be settled this coming spring. *Batesii* is not common here, and I have taken perhaps a dozen examples in course of several years; all these were flying with *marcia*.

* DESCRIPTION OF PREPARATORY STAGES OF THAROS.

EGG.—Conoidal, truncated, depressed at summit, rounded at base the lower half indented like a thimble, the excavations being shallow and arranged in close and regular rows; the upper half smooth, with about 15 slightly raised vertical ribs, terminating at the rim above; color pale green. Laid in clusters on the leaves of any species of Aster. Duration of this stage 4 to 7 days.

YOUNG LARVA.—Length .06 inch.; cylindrical, largest anteriorly, the segments each well rounded; sparsely pilose, the hairs black, and on the anterior segments directed forward; color yellow-green clouded with brown; head ob-ovate, deeply cleft; pilose; color dark brown. Duration of this stage 5 to 6 days.

AFTER FIRST MOULT.—Length .1 inch.; cylindrical, stoutest in the middle segments; armed with 7 rows of short, fleshy, brown spines, each thickly set with short, concolored bristles; there is also at the base of body a row of small spines, similar to the others, one on each segment from the 3rd, and over the pro-legs two on each; the 2nd segment with a collar of minute spines; body striped longitudinally with light and dark brown and sordid white; the dorsum light brown edged with white, and on this brown area are two interrupted white streaks; on the side a dark brown stripe on light ground; and in line with the lower lateral spines a white ridge; under side, feet and legs brown; head sub-cordate, the vertices rounded, and across each a gray band; another band on front lower face; color shining black. Duration of this stage 5 to 6 days.

AFTER SECOND MOULT.—Length .22 inch.; same shape; the stripes almost the same, the white dull, the brown darker; head sub-cordate, dark brown or black; on each vertex a white spot and one on front lower face. To 3rd summer moult 3 days. Where the larva passed 3rd moult in the fall, the interval was from 7 to 14 days.

* NOTE.—As the publication of this paper has been delayed, I am able to say now (March 24th), that the hibernating larvæ spoken of have gone through their larval changes and are now in chrysalis, 11 of them. These all had passed 3 moults last fall, and have passed 2 since hibernation ended. As will be seen below, the coloration at both these moults differed in several respects from the summer coloration. I did not succeed in bringing alive through the winter any of those larvæ which hibernated after 2nd fall moult, but of those which passed 3rd in the fall, the larger part were living when I placed them in the greenhouse, 7th Feb'y.

AFTER THIRD FALL MOULT.—Length .3 inch.; the dorsum light brown, edged with faint white at the 1st lateral row of spines, the brown area showing two macular white streaks; below 1st laterals, a black stripe, the remainder of the side brown; a white ridge with 3rd laterals; spines generally brown, the bristles same, black-tipped; head sub-cordate, shining black; with a gray, illy-defined spot on each vertex, and another on each side of face; some gray points also back of the last.

AFTER FOURTH MOULT, IN SPRING.—Length .44 inch. Body yellow-brown, dotted with yellow-white; the spines short, stout at base blunt at top, yellowish at base, brown above; the bristles short, divergent, brown, black-tipped; along the dorsal row a black stripe; a yellow stripe runs with 1st laterals, usually broken and somewhat irregular, most continuous on either side of each spine; a yellow band in line with 3rd laterals; head small, cordate, bronze or black, shining, with a few black hairs; across each vertex a narrow yellowish bar; a yellow triangular spot on front lower face, at the lower angles connecting with a curved yellow bar which runs to the back of the head.

AFTER FIFTH AND LAST MOULT, IN SPRING.—Length .6 inch. Color blackish-brown, dotted, especially on dorsum, with yellow; the spines more tapering, stout at base, blunt at tip, mostly yellowish at base; the bristles brown, black-tipped; on dorsum a black stripe, but often wanting; a yellow stripe in line with 1st laterals, and a yellow band below 3rd laterals; in some examples there is a black stripe between 1st and 2nd laterals; head bronze, shining, with black hairs; across each vertex a narrow whitish bar, thickened at the front and bluntly barbed on outer side; in front a triangular spot, connecting at the lower angles with a sickle-shaped bar on side, both yellowish. In other respects like 4th summer moult. Length at maturity .85 inch.

AFTER THIRD SUMMER MOULT.—Length .45 inch. Color olive brown; the dorsum much specked and dotted with dull white; a dull white stripe in line with 1st laterals, and a band of same color below spiracles, above which is another band, rather indistinct, whitish, macular; under side dark brown; the spines brown, light tipped, many with yellow, sometimes orange bases; the bristles black; head cordate, bronze; a straight silvery bar across each vertex; a triangular white spot in front, connected with a curved white line on either side, and white on the mandibles. To next moult 3 to 5 days.

AFTER FOURTH AND LAST MOULT, IN SUMMER.—Length .80 to .85 inch.; when mature, .90 to .95 inch. Cylindrical; color dark brown, dotted with yellow, and striped with yellow and black, the yellow always dull; armed with 7 rows of spines, 1 dorsal, and 3 on either side, besides smaller spines, arranged as after 1st moult; the spines stout, tapering, dark brown, in part white-tipped, those of 1st and 3rd lateral rows more or less orange tinted at base; each spine beset with many stout, straight, black bristles; next below 1st laterals a blackish stripe, edged on the dorsal side by yellow; in line with the lower laterals a yellow ridge; head cordate, either black or bronze; on each vertex a transverse white band; in front a cordate yellow spot, and on each side a sickle-shaped yellow stripe. Duration 4 to 6 days.

CHRYsalis.—Length .50 inch.; cylindrical, thickest at 9th and 10th segments; head case narrow, excavated at the sides, nearly square at top; the mesonotum moderately prominent, compressed at summit, and followed by a slight depression; the anterior edges of the last four segments of the abdomen prominent, especially of the foremost, which is developed into a ridge; on the abdomen several rows of fine tubercles; the color varies, being light cinereous, covered with fine abbreviated streaks; or it may be cinereous on dorsum, the rest yellow brown; or a dull white mottled dorsally with brown; or wholly dark brown finely mottled with gray. Duration from 6 to 13 days, unless retarded by cold.

DESCRIPTION OF A NEW SPECIES OF HESPERIAN FROM TEXAS.

BY W. H. EDWARDS, COALBURGH, W. VA.

Pamphila Meskei.

Female—Expands 1.4 inch.

Upper side blackish-brown; primaries have the costal margin to cell and nearly to apex densely covered with fulvous; the basal area and the inner margin sprinkled with fulvous scales; and the cell wholly deep fulvous except towards the outer end, where through the middle runs an oar-shaped blackish stripe; midway between cell and apex an elongated yellow-white spot, cut into three by the sub-costal nervules, the one of these spots nearest costa nearly lost in the fulvous ground; across the disk an oblique band of yellow-white spots, the upper one small and in

the upper discoidal interspace, placed a little outside the costal spot, the lower one in the submedian interspace, the spots widening as they proceed towards inner margin, and the 3rd and 4th deeply excavated on the outer side. Secondaries have the costal margin blackish like the hind margin, but the rest of the wing is sprinkled with fulvous, and the inner half covered by long dull greenish hairs; between the cell and margin an extra discal bright fulvous bar crossing three interspaces; fringes whitish.

Under side uniform bright orange, only the inner margin of primaries and a narrow space below the cell to base being fuscous; the spots on primaries faintly reappear in paler color than the ground, reduced in size, and at the end of the cell are two faint, yellow, horizontal bars, one at either side of cell. Secondaries immaculate except for two or three yellowish points corresponding to the spots of the extra discal bar.

Body above covered with dull green hairs, the collar orange, and the hairs at base of antennæ partly orange-fulvous; thorax below yellow-white, the abdomen yellow, on the sides and at the end orange; legs ochrey and yellow-white; palpi orange, as are the hairs of the collar; antennæ blackish above, yellow below; club fuscous.

From a single example in the collection of Mr. Otto Meske. The species is allied to *attalus* Edw. and *seminole* Scud., but is larger, more brightly ornamented on upper side, and beneath is not to be mistaken for any other species, owing to its bright orange surface. The male yet unknown. Taken in Bastrop Co., Texas.

CORRESPONDENCE.

I think it would be beneficial if a portion of the journal-space were devoted each month to a notice of the localities, habitats, food and habits of some of our rarer species, the best methods and apparatus for their capture, and the most approved way of putting them to death without damage, as also of pinning, setting and preserving them. These matters may seem of but slight consequence to the practised collector, but they assume an aspect of the greatest importance in the eyes of a beginner. In this connection, if Entomologists throughout the province would relate their experience in successfully collecting certain families of insects, and describe any method, implement or apparatus which they have found advantageous, and at the same time record the date, time of day, locality

and habitat of their captures, a judicious selection of the same would, I think, add much to the popularity, and not a little to the utility of the journal.

The question of the localities I consider as of very great importance, especially when united with the season at which certain insects may be expected to appear. Entomologists visiting remote sections of the country would, if such observations were duly registered, be directed whither to go in order to obtain specimens of species which might be rare or wanting entirely in their own neighborhoods. For instance, I have never captured any of the *Lycænidæ*, nor ever known one to be captured in the immediate vicinity of Belleville, though in Madoc, about 30 miles north, I saw them in great profusion in the middle of May, 1868. Again, *P. asterias* is very common in this town, while only a few stragglers of *P. turnus* are ever seen. In the township of Lake, about 25 miles north-west from Madoc, and a very wild district, *P. turnus* is abundant, while I did not observe a single specimen of *asterias* in three weeks of the height of the season.

I think it would also be desirable to give from time to time notices of works on the science, especially such as refer to the discrimination of insects, and to give a list of such books as are likely to be of service to young collectors. You will see that I am an advocate of the *propaganda*. Every collector is certain to meet with rare, and is not unlikely to capture hitherto undescribed species, and if "in the multitude of counsellors there is wisdom," so in the multitude of collections there is knowledge.

JAMES H. BELL, Belleville, Ont.

I found in opening some *cecropia* cocoons lately, two pupæ in one cocoon. These were of different sex, and in opposite position as regarded the loose end of cocoon; neither was perfectly formed, apparently owing to their being crowded out of shape in the limited space. The cocoon was one of the "loose" kind; both inner and outer cocoons and floss were uniform in texture, showing no line by which the work of two larvæ could be distinguished. There was, however, a rudimentary division on the inside of the inner cocoon at its close end, partly enclosing the abdominal end of the ♂ pupa. In writing of *Ophion macrurum*, p. 220, v. 8, I omitted the word "imago." *Ophion* pupæ would hardly be a rarity, since over 20 per cent. of *polyphemus* are thus affected, but *Ophion* imago in October and November are new to me. The cocoons were kept in a cold room.

C. E. WORTHINGTON, Chicago.

The Canadian Entomologist.

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No. 4

NOTES ON THE EARLY STAGES OF SOME MOTHS.

BY L. W. GOODELL, AMHERST, MASS.

Mamestra adjuncta Guen.

Larva, 1 example—Body smooth, thick and uniform to the 11th segment, from which it tapers abruptly to the end. Cinnamon brown; a large sub-dorsal, velvety, dark brown shade on the 4th, 5th and 11th rings, and on each of the remaining rings, except the three first and last one, is a dorsal curved line, and two small roundish spots of the same color; two larger, square, dark brown dorsal spots edged with yellowish-white, on the first ring. Head roundish, as wide as the body. Venter dark brown. Spiracles white, edged with dark brown. Length when full grown, 1.4 inches. Changed to a pupa Aug. 30. Feeds on *Pteris aquilina* (common brake).

Pupa—Length 0.7 inch; subterranean; black, of the usual form, with a slender forked spine. Imago, June 27.

Apatela hamamelis Guen.

Larva, 9 examples—Body of uniform thickness, with a few short, scattered, whitish hairs on the sides. The color varies from pale yellow to yellowish-red. A row of connected, triangular, dark brown spots on the back, and obscure shades and spots of pale brown on the sides. Venter bluish-green. Head round, flattish in front, as wide and concolorous with the body. When not feeding it rests with its head turned to the side of the body. Average length, 1 inch. Feeds on the Chestnut. About the last of August they make cocoons of bits of wood and grains of earth on or near the surface.

Pupa—Length 0.5 inch, of the usual form and color. Imagines appeared June 3rd to 9th.

Eupithecia absynthiata Linn.

Larva, 4 examples—Body slightly attenuated posteriorly. Color pale red; an indistinct, brownish, broken dorsal stripe on the eight middle rings, and a wavy, pale yellow line on each side. Venter and anal prolegs tinged with bluish. Head as wide as the prothoracic ring, flattish and concolorous with the body. Length when fully grown, 0.6 inch. Found feeding on the flowers of the Cockscomb (*Celosia cristata*). Sept. 28th to 30th they made rather brittle cocoons of grains of earth just beneath the surface.

Pupa—Length 0.20 to 0.24 inch; obtusely conical; wing cases and anterior part of the thorax dark greenish; abdomen yellowish-brown. Imagines Nov. 4th to 10th.

Tetraxis lorata Grote.

Larva, 1 example—Body attenuated anteriorly; 2nd and 11th rings slightly swollen. Color, when about half grown, light gray, tinged with brownish and variegated with ash; when fully grown, dark brown mixed with light brown and gray. There are about eight pairs of small, pointed, black warts on the back. Head a little wider than the prothoracic ring, not retractile; brown, with two small black spots, edged below with white in front. Length when full grown, 1.2 inch. Feeds on the Sweet Fern (*Comptonia asplenifolia*). Sept. 22nd it spun a thin cocoon, mixed with bits of leaves, and was transformed to a pupa on the 25th.

Pupa—Length 0.6 inch. Thorax and wing cases pale wood color, densely speckled with brown; abdomen reddish, speckled with brown; a row of black spots on each side, and a small, black dorsal spot on the anterior part of the thorax. Caudal spine flattened and rather short. Imago disclosed Jan. 20th by artificial heat.

Ephyra myrtaria Guen.

Larva, 23 examples—Body smooth and of uniform width; reddish brown striated with ochreous; a large sub-dorsal dark brown shade on each of the six middle rings, and a darker dorsal stripe. Head round and slightly bifid, a little paler than the body and larger than the prothoracic segment. Average length when fully grown, 0.7 inch. It is very much attenuated when young and of a brighter color. Feeds on Sweet Fern (*Comptonia asplenifolia*) and on the Huckleberry (*Gaylussacia*). When about to change to a pupa it fastens its anal prolegs firmly to the

under side of a horizontal twig, and slings itself by spinning a thread of silk over the middle of its body, which is fastened by two strands at each end.

Pupa—Widest and truncated anteriorly, tapering regularly to the tail, and with two ear-like protuberances in front. Color, body very pale flesh color, with the abdomen more or less thickly spotted with black; wing cases paler than the body, with a black streak along the upper margin; a small dorsal black spot on the anterior part of the thorax.

A variety of this species, of which I found thirteen examples, is dark brown with black sub-dorsal shades, which are edged below with grayish; there are also two small black spots on the back of the first ring of the body. •

ON DEILEPHILA CHAMÆNERII AND LINEATA.

BY THE EDITOR.

Both these members of the Sphinx family are found more or less plentifully in nearly all portions of the Provinces of Ontario and Quebec; *lineata*, as far as we have been able to learn, is more abundant in Ontario and *chamænerii* in Quebec. They are both very handsome moths, and so strong and active when on the wing that it is difficult to capture them without injury. About twilight or a little later their period of activity begins, when they may be seen flitting about with spectre-like rapidity, hovering like the humming bird over flowers, into which their long and slender tongues are inserted in search of the nectar there stored.

They are much alike. In both the ground color of the fore wings is of a rich greenish olive, crossed about the middle by a pale buff stripe or bar, extending almost the whole length to the tip, while along the outer margin there is another band or stripe nearly equal in width, but of a dull ashy color. The hind wings are small, with a wide rosy band, which covers a large portion of the wing, while above and below, the color is almost black, the hinder margin being fringed with white. In the markings on the bodies they also resemble each other very much. There is a line of white on each side, extending from the head to the base of the thorax, and other less prominent longitudinal lines of white on the thorax.

The abdomen is of a greenish olive, having a reddish hue on the sides and spotted with white and black.

There are differences, however, which would enable the most casual observer to separate them without difficulty. There is a difference in size, *lineata* (fig. 3) being the largest, measuring when its wings are spread about three and a half inches, while *chamenerii* (fig. 2) rarely exceeds two and three-quarter inches. The central band on the fore wings in *chamenerii* is wider and more irregular, but the most striking point of difference between the species is that the veins of the fore wings in *lineata* are distinctly margined with white, a character entirely wanting in *chamenerii*. These differences will be readily appreciated by reference to the figures.

The larva of *lineata* varies considerably in color. Mr. Riley says : "The most common form is that given at fig. 4, where the body is of a yellowish green, with a prominent sub-dorsal row of elliptical spots, each spot consisting of two curved black lines, enclosing superiorly a bright crimson space and inferiorly a pale yellow line, the whole row of spots being connected by a pale yellow stripe edged above with black. In some specimens these eye-like spots are disconnected, and the space between the black crescents is of a uniform cream color. The breathing holes are either surrounded with black or black edged with yellow. The other form of the caterpillar (see fig. 5) is black, with a yellow line along the back and a series of pale yellow spots and darker yellow dots. This dark form is, however, subject to great variation, some specimens entirely lacking the line along the back."

According to Mr. Riley, it feeds upon purslane, turnip, buckwheat, water melon, and even grape and apple leaves, and is found in the larval condition during the month of July. Mr. Pyle, of Dundas, Ontario, has found it feeding on the common plantain. When full grown it is said to descend into the ground, where within a smooth cavity it changes into a light brown chrysalis, emerging as a moth in September.

LARVA OF *D. CHAMENERII*.

Described from three specimens found feeding on grape, July 5th.

Length, two and a half inches, onisciform.

Head small, rather flat in front, slightly bilobed, and of a dull pinkish brown color, with a black stripe across the front at base. Basal half of



Fig. 2.



Fig. 3.



Fig. 4.



Fig. 1.

palpi yellow, upper half black. Mandibles black, with a patch of yellow between them and the black stripe.

Body above deep olive green, with a brownish tinge and a polished surface. Second segment with a cervical shield similar in color to head, its sides dull greenish, with two yellow dots. There is a pale yellowish dorsal line terminating at the base of the caudal horn; each segment from 3rd to 12th inclusive has a pale yellow spot on each side the dorsal line, about half way towards the stigmata, those on 3rd segment small and almost crescent-shaped, on 4th larger and nearly round, 5th still larger, nearly round, 6th, 7th, 8th, 9th, 10th and 11th about equal in size, nearly oval and larger than those on 5th. On 12th segment the spot is more elongated, and extending upwards, terminates at the base of the caudal horn. There is a wide but indistinct blackish band across the anterior part of each segment, in which the yellow spots are set; the sides of the body below the spots are thickly sprinkled with minute raised yellow dots. Caudal horn long, curved backwards, red, slightly tipped with black, and with a roughened surface; terminal segment dull pinkish; stigmata oval, yellow, shaded around with dull black.

Under surface much paler, color dull pale pinkish green, the pink color predominating from 5th to terminal segments inclusive, and with a number of very minute raised yellowish dots placed chiefly along the sides. Feet black; pro-legs pink, with a patch of black on the outside of each. One specimen spun a light web, binding a portion of the leaf in the manner of *pampinatrix*, within which it changed to chrysalis on the 10th of July, and from this the imago appeared on the 28th of the same month. The other two larvæ died before completing their transformations.

SIX NEW NOCTUÆ.

BY A. R. GROTE,

Director of the Museum, Buffalo Society Natural Sciences.

Eustrotia maria, n. s.

Fore wings pale carneous brown shaded with dusky; terminal space more blackish. Median lines fine, black, approximate, angulate. A curved sub-basal shade on internal margin. Reniform narrow, outwardly curved or

oblique, white and contrasting, set in a dark suffusion of the disc. Subterminal line even, with a costal angulation. A fine dark terminal line at base of concolorous fringes. Hind wings pale, shining with traces of median shades and the fringes slightly carneous; abdomen concolorous with hind wings. Beneath fore wings dusky, hind wings pale with mesial shade. Fore wings above showing pale costal dots; beneath there are pale costal shades and the costal angulation of the s. t. line is apparently reflected. *Expanse* 21 mil.

Several specimens taken on the Lake Shore, near Buffalo, N. Y., in July, by Miss Mary Walker, after whom the species is named.

Thalpochares orba, n. s.

A large form resembling *mundula* in color and cut of wing, but stouter and with longer palpi. Its generic position is not assured. Fore wings dark brown, with the narrow median space almost black. The median lines are even, pale ferruginous brown, contrasting. The outer or t. p. line occupies almost the centre of the wing and is not angulate opposite the cell as is *mundula*, but obtusely bent. A faint festooned line follows the t. p. line. The irregular subterminal is relieved by a following pale shade. The reniform is a small ringed spot. No traces of the other stigmata. Fringes concolorous, cut outwardly with pale. There is a delicate violet reflection over the fore wings. Hind wings and abdomen blackish fuscous. Beneath fuscous with discal dots and a common even mesial line relieved outwardly by pale shading. *Expanse* 21 mil. Loc., Demopolis, Alabama.

Spragueia plumbifimbriata, n. s.

Among the specimens belonging to this genus collected by Mr. Belfrage, in Texas, are several under the number "127" which I cannot refer to *dama* or *leo*, although closely allied to these. The fringes in *dama* are orange colored with a leaden fleck opposite the cell; of *leo* lead-color except at the internal angle, where they are fulvous. In the new species they are entirely plumbeous. The thorax and fore wings at base and along costal region are very pale yellow, like the palest tint in the other two species. The rest of the wing is taken up by two broad lead-colored patches or bands, separated by a narrow rusty line at the middle of the wing from the middle to internal margin. The first band stretches narrowly to costa without the first transverse line, which is barely indicated

The discal spot is situated without and above the extremity of the mesial line, which is apparently the lower portion of the transverse posterior. The terminal margin is narrowly fulvous. Hind wings and abdomen pale fuscous, not so dark as in allied species. Beneath paler than in its congeners. *Expanse* 14 mil.

This cannot be the *onagrus* of Gueneé, which seems to me to be the same species as *leo*.

Fruva, n. g.

Although the neurulation agrees with *Spragueia*, the three forms here included differ by the bulging clypeus and the infra-clypeal plate. In *fasciatella* this is exaggerated and the surface of the clypeus is flattened or slightly depressed, reminding us of *Tarache*. The species are rather longer winged than *Spragueia* (*agrophila* of Gueneé in part) and differ by their plain unspotted fore wings. The three species I would here include are *F. tortricina* (Zell.), *F. fasciatella* Grote (which is the generic type) and the following :

Fruva obsoleta, n. s.

Allied to *tortricina* rather than to *fasciatella*, but resembling the latter more in color. The front does not seem to be shallowly depressed. Entirely plain colored. Fore wings fuscous, overlaid with ochrey scales, without markings. Hind wings pale fuscous with whitish fringes. Beneath whitish, glistening; fore wings with blackish disc and fringes, the latter whitish on secondaries. *Expanse* 19 mil. Algonquin, Illinois, June 1; Dr. Nason.

The species *Tarache angustipennis* comes very near *Fruva*, and may ultimately be removed to the latter genus.

Tripudia, n. g.

The little species with simple and rather short antennæ belonging to this genus are among the frailest of the family. They are dark-colored, beneath shining, and remind one of certain *Pyalideæ*. The body parts are small in proportion to the wings; the abdomen not exceeding the secondaries. The wings are wide, outwardly full. Eyes naked, palpi rather long, divaricate, pointed. All the parts are closely scaled. Tongue rather stout. Legs unarmed. (The neurulation should be examined, but have only two specimens and cannot now destroy either.)

The first and larger species is *Tripudia quadrifera*, the *Erastria quadrifera* of Zeller from Mazatlan, Mexico, represented by a single fresh specimen from Texas, received by me from Mr. Meske. This species is totally dark with a velvety patch on median space. On the hind wings both species beneath are distinctly marked.

Tripudia flavofasciata, n. s.

Very small, with a broad yellow band filling up the sub-basal space obliquely on primaries. Base of the wing blackish. Beyond the yellow band the wing is blackish with scattered pale or shining points, the ornamentation difficult to trace. The subterminal line is indicated very near the margin by pale festoons. Hind wings totally blackish as in *quadrifera*. Beneath the fore wings are blackish, with pale discolorous internal margin as in *quadrifera*. The hind wings show a discal spot ringed with pale and a pale subterminal line very near the margin. *Expanse* 7 mil. Demopolis, Alabama, collected by myself in the day time hovering over flowers, in the month of June.

In the ornamentation of *quadrifera* Prof. Zeller sees a resemblance to *Plusia*. Both species must be added to the "List of North American Noctuidæ."

Glaea carnosæ.

The male of this species has the antennæ pectinate. A specimen has been sent me by Mr. Roland Thaxter, taken on Long Island. It will thus fall into a distinct section of the genus. We must also separate from the other species *tremula* and *pastillicans* (perhaps too closely allied to be distinct species) on account of the dorsal thoracic ridge of hair. According to a determination by Mr. Morrison, *venustula* is a synonym of *sericea*. I am still at a loss, however, to account for the statement that the claviform spot is marked in white. None of my specimens in this genus show any trace of the claviform spot.

Antaploga, n. g.

Belongs to the series of Noctuid genera related to *Schinia* Hübn. The palpi are short; tongue moderate; antennæ simple. Legs slender; fore tibiæ with a long and rather large, pointed claw. Vestiture of the body and appendages consisting of flattened scales. Front with a naked protuberance, arising from a narrow rim which is exposed inferiorly; the

protuberance rises above, absorbing the rim, and its surface is irregularly roughened. The structure differs from *Fala*, in which a wedge-shaped protuberance arises from a cup; or from *Plagiomimicus*, which has the cup empty. The scaly vestiture and the shape of the wings are distinctive. These latter remind one of *Pippona*. The costal margin of primaries is long, external margin very oblique, apices produced, internal margin comparatively short.

Antaploga dimidiata, n. s.

Head, thorax and basal third of fore wings white. Beyond, the wing is blackish brown, limited obliquely and a little unevenly from the white basal portion by the difference in color. A whitish subterminal shade. A discal mark obscurely indicated on the darker portion of the wing. Hind wings pale fuscous with white fringe; beneath whitish. Fore wings beneath fuscous. *Expanse* 30 mil. *Hab.* Colorado, Prof. Snow.

TINEINA FROM TEXAS.

(Continued from February No.)

BY V. T. CHAMBERS, COVINGTON, KY.

BLASTOBASIS.

My knowledge of this genus is derived wholly from Prof. Zeller's paper. It is equal in part at least to *Holocera* Clem. (I have to thank Prof. Riley for calling my attention to the fact that in some of my references to this genus the name is incorrectly given as *Holocera*.)

B. sciaphilella Zell., as described and figured, differs from *H. triangularella* Cham. as to the position, size and form of the triangular spots on the wings. *Sciaphilella* has distinct opposite, comparatively small costal and dorsal triangles, while *triangularella* has no dorsal triangle, but a single large costal one, wide upon the costa and crossing the fold, and it also has the apical part of the wing distinctly streaked and clouded with brownish gray. They do not seem to differ otherwise.

In a former paper I have referred to *H. glandulella* Riley some other Texas specimens differing slightly from typical bred specimens of *glandulella* and from Prof. Riley's description. The form described by Prof. Zeller as *B. nubilella* is one of these, and is, I think, only a variety of *glandulella*. Prof. Riley concurs with me in this, and he thinks *triangularella* and *sciaphilella* are also varieties of it. I am strongly inclined to concur with him. I have made some remarks on this subject in the former paper.

Argyresthia austerella Zell.

A. undulatella Cham.

I have never met with a specimen quite so strongly marked as that figured by Prof. Zeller, but I have elsewhere (*ante v. 6, p. 10*) remarked on the amount of variation in the intensity of the markings of the species. I have known it many years, and while I write (June 3rd, 1876) it swarms in hundreds around elm trees in this region. It is not improbable that the dark markings are deeper in more southern localities. Other species of *Argyresthia* have the habit of undulating or "see-sawing," but none that I have seen practice it to such an extent as this. Prof. Zeller first described it.

Actole bella Cham.

Before I saw Prof. Zeller's description of *Heliozella gracilis*, I thought it not improbable that it would prove to be this species, because of the resemblance in structure of the head and its appendages in the two genera and the fact that both were taken in the same locality, where *A. bella* seems to be not uncommon. They are, however, quite different creatures. *Actole* perhaps approaches *Helissines* as nearly as it does *Heliozella*. I have, however, no acquaintance with either genus other than through written accounts of them, having never seen a species of either. *A. bella* resembles *Chrysoclista lineella* in ornamentation more than it does any other species known to me.

COLEOPHORA.

C. bistrigella.

With fresher specimens before me, I amend the description of this species. Snowy white, in some lights silvery. The fore wings have two rather pale ochreous-yellow streaks from the base, one of which is above

the fold and goes to the tip, its basal half being margined above by a line of brown scales, and its apical part margined similarly towards the fold. The other streak is just within the dorsal margin, and goes to the dorsal ciliae. *Al. ex.* a little over $\frac{1}{2}$ inch.

LAVERNA.

L. œnothæella Cham.

This is evidently the species which had been previously described as *Phyllocnistis magnatella* by Prof. Zeller, "*Bistrage*, &c., 1873," and I confess to feeling some surprise on finding it referred to *Phyllocnistis*, though after reflection I find the mistake in locating it there not so great as it at first appeared to be. Still I think it is more properly placed for the present in *Laverna* than in *Phyllocnistis*. I placed it with some hesitation in *Laverna*, and admit that it is not a true *Laverna*, and I think a new genus will ultimately be erected for it. Indeed, I at first prepared the diagnosis of such a genus, but finally considering the somewhat heterogenous character of the genus *Laverna*, I ultimately concluded not to separate it from that genus at present. It may be that I attribute too much importance to neururation as affording generic characters; nevertheless, I think it probable that in the scarcity of specimens Prof. Zeller did not examine the neururation of this species, or he would not have referred it to *Phyllocnistis*, and I feel still more confident that he would not have so done had he known the larva and its habits; while, on the other hand, I perhaps should not have been surprised to see it referred to *Phyllocnistis* had I not known its neururation, and its larva and larval habits as given by Miss Murtfeldt in CAN. ENT., v. 7, p. 31. Like Prof. Zeller, I was struck by its resemblance in ornamentation to *Lyonetia*, so that my MSS. specific name, before I knew its larval habits, was *lyonetiella*.

My reasons for venturing to differ from Prof. Zeller as to its generic affinities are as follows: 1st—Considering the minute size of all other known species of *Phyllocnistis*, and their close resemblance in ornamentation, the much greater size (nearly three times the *alar ex.* and nearly our times the weight) of this species and the difference in ornamentation which, however, bears some resemblance to that of a *Phyllocnistis*, I should have suspected structural differences as great as those of size. 2nd—The characters drawn from the head and its appendages, while very nearly those of *Phyllocnistis*, do not differ in any important particular from those of some species of *Laverna* and of some other genera allied thereto;

greater differences, for instance, exist between the palpi of *L. langiella* and *L. laetiella* than are found between the latter and *magnatella* Zell. 3rd—The neururation of the wings places the species among *Elachistidae* and not in *Lyonetidae*. The neururation of the fore wings is exactly that of *Laverna Staintoni*, as figured *Ins. Brit.*, v. 3, except that in this species the apical branch of the median vein goes to the apex instead of to the dorsal margin before it. As in *Laverna*, the submedian is furcate at the base, which is not the case with *Phyllocnistis*; and though, owing to the peculiar ornamentation of the apex, the fore wings appear to be decidedly caudate, yet when denuded, they are found to be scarcely more so than in *Laverna atra* as figured *loc. cit.* The form of the hind wings is very nearly that of *L. epilobiella*, figured *loc. cit.*; and the neururation is identical with it except that the superior branch of the subcostal goes to the apex instead of to the costal margin just before it, and *the cell is indistinctly closed*. The fold and the dorsal vein are both distinct. In all these particulars it differs greatly from *Phyllocnistis* and agrees with several well recognized species of *Laverna* as well as, if not better, than they do with each other. 4th—The larval habits, as described by Miss Murtfeldt, *CAN. ENT.*, 7, p. 31, are those of several species of *Laverna*, but of no known species of *Phyllocnistis*, and the larva, while not closely resembling any *Laverna* larva known to me, is still more unlike that of *Phyllocnistis*, in fact, totally distinct from it, having sixteen feet. For these reasons I think its affinities are with *Laverna* and not with *Phyllocnistis*. The specific name *magnatella* Zell. has priority over *ænothærella*. *Magnatella* is very appropriate if the species belongs in *Phyllocnistis*, but not if it is a *Laverna*. I have never seen *L. eloisella* Clem., but I suspect that it will be found congeneric with this species.

I find that in the description of the species I have inadvertently omitted to mention the large tuft of raised scales margined behind with brown, and the short, longitudinal, black line behind it, situated within the margin at the base of the dorsal cilia, between the "two streaks which diverge from the small tuft within the dorsal margin before the ciliae." See v. 7, p. 31.

L. unicristatella Chamb. previously described by Zeller as *L. definitella*.

DESCRIPTION OF A NEW LIMACODES.

BY LEON F. HARVEY, M. D., BUFFALO, N. Y.

Limacodes latomia, n. s.

This species is similarly sized with *y-inversa*, or perhaps a little larger. It is less brightly colored. The fore wings are dusky ochre with two blackish lines; the first crossing the wing a little obliquely at the middle; the second before the apex from costa to external margin. The lines do not meet at costa as in its ally. The space between the lines is *discolorous*, being somewhat grayish. Hind wings more yellowish, concolorous. Beneath immaculate, like hind wings above. Thorax like fore wings. Antennæ simple. Several specimens taken by Belfrage in Bosque Co., Texas; No. 572, May.

NOTES ON SOME SPECIES OF MELOE OCCURRING IN
TEMPERATE NORTH-EASTERN AMERICA.

BY F. B. CAULFEILD, MONTREAL, P. Q.

The life history of *Meloe*, as given by the Editor in the December No. of this journal, agreeing very closely with that of *M. angusticollis* Say, as far as my knowledge of its habits will permit me to judge, it occurred to me on reading Mr. Brodie's very interesting notes in the January No., that unless we have in this country a double brooded *Meloe*, some one must be referring another species to Say's *angusticollis*.

We have in temperate North-eastern America several species of *Meloe* closely resembling each other in general appearance, two of which are widely distributed, sometimes, probably often, occurring in the same localities, but I think at different seasons; the first, *M. angusticollis* Say, appearing early in May and disappearing before or about the middle of June; the other, *M. americanus* Leach, appearing in the latter end of July or beginning of August, and lasting until after the early frosts.

Having compared specimens of what I believed to be *angusticollis* with Say's description, I felt satisfied that I had that species, but I took *americanus* Leach to be *rugipennis* Lec., from having compared it with

specimens of *americanus* labeled *rugipennis*, in the collection of the Montreal Natural History Society, and from records of the capture of *rugipennis* in other localities at dates corresponding with the time of appearance of *americanus* here. However, as our *Meloes* resemble each other very closely, and as the description of *rugipennis* did not seem to suit the specimens labeled as that species, I did not feel justified in trusting to my own judgment in the matter, and sent a specimen of each species to Dr. LeConte, with the request that he would determine them for me. Having examined them, Dr. LeConte informed me that my determination of *angusticollis* was correct, and with his consent, I give the following corrected synonymy, which he very kindly sent to me :

"1. *M. ANGUSTICOLLIS* Say = *rugipennis* Lec. --Punctures of head and prothorax coarse and deep. This has been considered by some author, as = *VIOLACEOUS* Marsham. of Europe, but I have not compared them ; one specimen in my collection was thus labeled.

"2. *M. AMERICANUS* Leach—*angusticollis* Lec. Punctures very fine and prothorax still narrower."

As Say's description of *angusticollis* is very good, I give it for the benefit of those who may not have access to the work in which it is given, viz., Jour. Acad. Nat. Sci., Phil., 3, 280 :

"*Meloe angusticollis*. Thorax narrower than the head, elytra and abdomen violaceous. Inhabits Pennsylvania. Body dark violaceous, punctured ; head with profound punctures, an impressed, longitudinal, abbreviated, acute frontal line, and a transverse, elevated, obtuse one connecting the bases of the antennæ. Thorax slender, narrower than the head, profoundly punctured, widest rather before the middle, and narrowed at tip and base ; base emarginate and slightly margined. Elytra rugulose dark bluish-violaceous. Feet slightly hairy ; spines of the tibia and nails ferruginous. Abdomen slightly rugulose, dark greenish or violaceous ; tergum, each side black, opaque."

M. americanus Leach is a smoother and more delicate looking insect than *angusticollis*, and the blue is inclined to shade into green in certain lights, especially on the head and thorax ; the punctures are so fine as to be almost invisible to the naked eye (in *angusticollis* the coarseness of the punctures give it a slightly roughened appearance). The acute, impressed frontal line, so characteristic of *angusticollis*, is wanting in *americanus*, and altogether it is a softer and more oily-looking insect.

M. angusticollis Say, makes its appearance here in the beginning of May, very soon after the snow has melted. I first observed it in 1872; I cannot now give the exact date, but it was early in May. I found three specimens on Montreal Mountain, one male and two females. Referring to my notes, I find the following dates for them in 1874: May 2nd, one specimen, Hochalaga, Montreal; May 13th, one specimen, Montreal Mountain; May 20th, eight specimens, Hochalaga, Montreal.

I did not observe them in 1875. On June 10th, 1876, the Montreal Natural History Society held their annual field day at St. Hillair, between twenty and thirty miles south of Montreal, and I was given a specimen of *Meloe* taken there on that day; unfortunately I did not preserve it, and cannot now be certain what species it was, but at the time I did not think it different from those I found in May, and as it was a female with the abdomen very large, I think it probable that it was the same.

I did not study their habits closely, as my spare time was chiefly devoted to Lepidoptera, but I only noticed them on warm, sunny days; I did not find any under stones, but I think it not unlikely that they may seek shelter under stones during wet or cold weather, as I have sometimes found to be the case with *Cicindela sexguttata*.

Mr. J. M. Jones, of Halifax, N. S., in a communication dated June 4th, 1871, CAN. ENT., vol. 3, p. 37, says: "*Meloe angusticollis* very abundant on Halifax common about the middle of May, now totally disappeared."

Mr. A. S. Ritchie, in his "List of Coleoptera taken on the Island of Montreal," records *M. angusticollis* Say, date of appearance not given; Coleoptera determined by Dr. Horn. This, I think, would be *M. americanus* Leach. In the same list Mr. Ritchie records *M. rugipennis* Lec. This, I think, would be *M. angusticollis* Say.

Mr. J. Pettit, in his "List of Coleoptera taken at Grimsby, Ont.," CAN. ENT., vol. 2, p. 132, records *M. angusticollis* Say. This is probably *M. americanus* Leach.

Mr. Wm. Couper, in his "List of Coleoptera taken at Quebec and other parts of Lower Canada," published at Quebec in 1864, records *M. angusticollis* Say as "common on potato-vines," no date given. As most of Mr. Couper's Coleoptera were named by Dr. LeConte, this also is probably *M. americanus* Leach.

I have no record of the capture of *M. americanus* Leach, myself, but

if I remember rightly, I took a *Meloe* rather late in the season, on Montreal Mountain, last summer. I thought at the time it was a soft, rich looking specimen, but I did not take a note of it. On reading Mr. Brodie's paper, I examined my specimens of *Meloe* carefully, and found a specimen of *M. americanus* Leach in a box of duplicate Coleoptera taken on the Island of Montreal, but at the time I did not know what it was. Having compared it with specimens labeled *rugipennis*, in the Montreal Natural History Society's collection, I found it to be the same; this specimen I afterwards sent to Dr. LeConte, who gave me the correct determination.

Mr. P. Kuetzing has kindly given me a pair of this species, taken by him in the latter end of July of last season (1876), in this neighborhood. This is the earliest record of the appearance of *americanus* known to me, but as Mr. Kuetzing only found the pair, and as the abdomen of the female is quite small, we may, I think, reasonably infer that they had just emerged, and were the pioneers of the August brood.

Mr. G. B. Pearson informs me that he has seen a species of *Meloe* common here during the latter part of summer, and noticed them late in October; doubtless the same species.

Mr. H. H. Lyman kindly lent me three specimens of *Meloe* for examination. One is *M. angusticollis* Say; the others are *M. americanus* Leach. Mr. Lyman informs me that the specimens of *americanus* were taken at Portland, Me., in August, 1873, but cannot tell when or where the other was taken. He says, however, that if it is *angusticollis*, it was probably taken at Montreal, as he never went down to Portland before the middle of July.

In a "List of Coleoptera found in the vicinity of Montreal," by W. S. M. D'Urban, Canadian Naturalist, vol. 4, p. 307, he records *rugipennis* Lec. as common. Mr. D'Urban states that nearly all the species were determined by Dr. LeConte.

In a "List of Coleoptera collected in the Valley of the River Rouge and neighboring Townships," by W. S. M. D'Urban, Geological Survey of Canada, report of progress for 1858, p. 226, he records *M. rugipennis* Lec., Hamilton's Farm, 31st August, and Grenville, 14th October.

In a List of Coleoptera collected on the south-east side of the St. Lawrence, from Quebec to Gaspé, and in the Counties of Rimouski, Gaspé and Bonaventure, by Mr. Robert Bell, jr., same report, p. 247, he records

M. rugipennis Lec. "between Metis and the mouth of the Matapedia." The date is not given, but as he records *Colias philodice* "between Metis and Lake Matapedia, August 17th," and as he did not arrive at Great Metis until August 14th, it must have been taken in that month or later. M. D'Urban, who drew up this list, states that Mr. Bell's Coleoptera were determined by Dr. LeConte.

I frankly confess that the records of Messrs. D'Urban and Bell puzzle me, for if the dates given by these gentlemen are correct, and if the specimens taken by them were determined by Dr. LeConte as *rugipennis* Lec., which is *angusticollis* Say, then that species must, I think, be double brooded. I believe, however, that if Dr. LeConte had seen specimens taken at those dates, he would have determined them as *M. angusticollis* Say, which would prove them to have been *americanus* Leach, when the dates would correspond with its time of appearance here, at Portland, and I believe, elsewhere. I am strengthened in this belief by the fact that specimens of *americanus* in the collection of the Montreal Natural History Society are labeled *rugipennis*, a mistake that Dr. LeConte would never have made.

I think Mr. Brodie's notes also point to the conclusion that *americanus* is the species found in autumn; this gentleman could give us important evidence in this matter by carefully comparing his specimens with Say's description, and letting us know which species they belong to. I do not think that any of our *Meloes* are double brooded, but if Mr. Brodie's specimens are the true *angusticollis* of Say, it would seem as if such must be the case, as it seems improbable that a species would be taken in some places in spring, and in others in autumn, if it was not double brooded.

Dr. Packard, speaking of the larvæ of *Meloe* found by him in spring, says: "It is undoubtedly the young of our common *M. angusticollis* Say." If we substitute the name *americanus* Leach for *angusticollis* Say, this statement will, I think, be perfectly correct, unless the larvæ observed by Dr. Packard belong to one of our other species (I only know *angusticollis* and *americanus*).

M. angusticollis probably oviposits during the end of May and beginning of June, and by the end of June and during July we might, I think, expect to find the larva. These are, however, points that require careful investigation, as nothing short of rearing the perfect insect will enable us to identify the larva.

I will during the coming season, as far as my time will permit, endeavor to ascertain the dates of appearance, duration, &c., of these species in this locality, and I trust that Entomologists in other parts will do the same, so that the life history of our North American species may be worked up.

IMPORTANT NOTICE.

In consequence of the pressure of other engagements, our Secretary-Treasurer, Mr. J. H. McMechan, has found it necessary to resign his office. Until further notice, our correspondents will please address *all* communications to the Editor.

BOOK NOTICES.

Packard's *Half Hours with Insects*, Boston, published by Estes & Lauriat, 1877, 12 mo., pp. 384, illustrated, \$2.50, which was originally issued in twelve numbers, has lately been published in book form. We desire to correct some typographical and other errors of importance. Page 187, in explanation of Fig. 187, for *Bucculating* read *Bucculatrix*; page 289, line 23, for *Disippus* read *Archippus*, and in line 25, for *Archippus* read *Disippus*; page 305, line 13, for sumac read cottonwood, and on page 306, in explanation of Fig. 236, for sumac gall read vagabond gall.

We cheerfully commend this useful work to our readers.

Report upon the Orthoptera collected by the Wheeler Expedition, by Samuel H. Scudder; 8vo., 17 p. In this paper the author gives much valuable information in relation to the Orthoptera occurring on the eastern slope of the Rocky Mountains; 17 new species are described, and definitions of 8 new genera given. Report of the Hayden Expedition, from the Department of the Interior, containing Brief Synopsis of North American Ear-wigs, with an appendix of the fossil species; 8vo., 12 p. List of Orthoptera collected by Dr. A. S. Packard in Colorado, &c., during 1875; 8vo., 7 p. Notice of a small collection of Butterflies made by Dr. Packard in Colorado and Utah. All by Samuel H. Scudder. We tender our best thanks to the author for copies of these papers.

The Canadian Entomologist.

VOL. IX.

LONDON, ONT., MAY, 1877.

No. 5

THE UNITED STATES ENTOMOLOGICAL COMMISSION.

The enormous losses occurring yearly to agriculture in America from destructive insects are gradually awakening public attention in this direction, and also to the necessity of careful observations on the habits of these pests, with a view to their destruction or limitation. We were much gratified to learn that the late Congress of the United States, recognizing the importance of this subject, made a liberal appropriation to provide for the appointment of a commission of practical Entomologists to investigate and study the habits and life history of these insect pests, and thoroughly test such measures as have been or may be suggested with the view of lessening their ravages, the investigations to be carried on for several consecutive years. The Government has been particularly fortunate in securing the services of three eminently practical Entomologists to undertake this work, Prof. Riley, State Entomologist of Missouri, Dr. A. S. Packard, of Salem, Mass., and Prof. C. Thomas, State Entomologist of Illinois; Prof. Riley has been designated chief, Dr. Packard secretary, and Prof. Thomas disbursing agent. While the destructive Rocky Mountain Locust, *Caloptenus spretus*, will specially engage the attention of the Commission during this year, careful observations will at the same time be made on other destructive pests. We desire to call particular attention to Dr. Packard's request in this present issue for specimens in all stages of the Hessian Fly, Joint Worm and Wheat Midge, and trust that all our members will endeavor to aid the Commission in their labors in every possible way.

The headquarters of the Commission will be at St. Louis, Mo.; there will also be an office, with a clerk to attend to certain routine business, at the rooms of the Geological and Geographical Survey of the Territories, at Washington, D. C., Dr. F. V. Hayden in charge.

The locust area assigned to each Commissioner the present year is as follows :—

1. Prof. Riley takes for his field the region east of the mountains and south of the 40th parallel, the west half of Iowa, and, conjointly with Dr. Packard, British America west of the 94th meridian, where the principal source of the devastating swarms will probably be found.

2. Dr. Packard will take for his field West Wyoming, Montana, Utah, Idaho, and the Pacific Coast.

3. Prof. Thomas takes all the region east of the mountains not enumerated, including Nebraska, Minnesota, etc.

The publications will consist of circulars, bulletins, memoirs, and the annual report of doings and results of the work of the Commission.

To Prof. Riley are assigned more particularly the following divisions of the subject : Biology, or Natural History ; Insect Enemies and Parasites ; Remedies and Devices for Destruction.

To Dr. Packard : Anatomy and Embryology.

To Dr. Packard and Prof. Thomas, conjointly : Meteorological Bearings and Migrations.

To Prof. Thomas : Geographical Distribution, Enemies not Entomological, Agricultural Bearings of the Subject.

The Commission expects to secure co-operation with the United States Signal Bureau in affording meteorological data in connection with a study of the migrations of the locust ; also, hopes to secure the aid of the Canadian Government in co-operating with it in its investigations in British America.

It is the determination of the Commission to confine its operations more particularly to the practical bearings of the subject, with a view to ascertain all possible remedies against these destructive insects. All else will be made subservient to the great object for which the appropriation was made, to wit :—

1. The best means of fighting the plague as it occurs in the States to which it migrates, but in which it is not indigenous.

2. The thorough investigation into its habits in its native home, with a view of preventing, if possible, its migrations therefrom.

The following are the topics on which data are requested from observers in all parts in reference to the destructive locust :—

1. Date, and time of day of the arrival of swarms.
 - 1a. Direction and force of the wind at the time.
 - 1b. Temperature and character of the weather at the time (clear or cloudy).
 - 1c. Direction of the flight, density, height and extent of the swarms.
2. Date and time of day of the departure of swarms.
 - 2a. Direction and force of the wind at the time.
 - 2b. Temperature and character of the weather at the time.
 - 2c. Direction of the flight, density and extent of the swarms.
3. Date when the first eggs, if any, were deposited the present year.
4. Date when the eggs were most numerous hatching the present year.
5. Date when the eggs were most numerous hatching in previous years.
6. Proportion of eggs that failed to hatch the present year, and probable causes of such failure.
7. Nature of the soil and situations in which the eggs were most largely deposited.
8. Nature of the soil and situations in which the young were most numerous hatched.
 9. Date at which the first insect acquired full wings.
 10. Date when the winged insects first began to migrate.
 11. Estimate the injury done in your County and State.
 12. Crops which suffered most.
 13. Crops most easily protected.
 14. Crops which suffered least.
15. The prevailing direction in which the young insects travelled, and any other facts in relation to the marching of the young.
16. The means employed in your section for the destruction of the unfledged insects, or to protect crops from their ravages, and how far these have proved satisfactory.
17. The means employed in your section for the destruction of the winged insects, or to protect crops from their ravages, and how far these have proved satisfactory.

18. Descriptions, and if possible, figures of such mechanical contrivances as have proved useful in your locality for the destruction of either the young or the winged insects.

19. If your section was not visited in 1876, please state this fact.

20. If visited any previous year, please give the dates.

21. To what extent have birds, domestic fowls, and other animals, domestic or wild, been useful in destroying these insects?

As the successful prosecution of this work is as deeply important to the western portions of our Dominion (where immense damage is often inflicted by this destructive foe) as to any part of the United States, it is hoped that our Government will render all possible aid to the work of this Commission, either by instructions to parties engaged in surveys and other Government work in the western regions, to make the necessary observations, or otherwise by appointing suitable co-operating agencies to aid in the work.

NOTES AND DESCRIPTIONS OF NEW MOTHS.

BY A. R. GROTE,

Director of the Museum, Buffalo Society Natural Sciences.

Every student knows how much depends on the careful handling and perfect condition of specimens of moths for the cabinet. Especially in the *Noctuæ*, where the scale tufts on the body are used for generic characters, is it necessary to have well preserved material in order to give a definite determination. In this respect the collections of Prof. Lintner, Mr. Hill, Dr. Bailey and (though last by no means least) Mr. Otto Von Meske are to be very highly praised. The students of Albany have shown themselves excellent collectors, and it is a great pleasure to examine their specimens. I do not say that Mr. Von Meske's collection is the best in the country in this respect, but I do say that it is the best I have yet seen. Sugaring for *Noctuæ* in April and May has been found very remunerative in the vicinity of Albany. Beautiful specimens of *Lithophane pexata*, *fagina*, *Bethunci*, *disposita*, *tepida* and *Thaxteri* have been taken in

this way. Dr. Bailey has captured in this manner *Scopelosoma devia*, *Graefiana*, and *tristigmata*; also *Morrisonia vomerina* and *evicta*. Species of the genus *Homoptera* have also occurred not unfrequently; among these I may mention *unilineata*, a species easily recognized by its strongly dentate pale brown wings, the exterior line deep brown on primaries, blackish on secondaries. It is to be hoped that this method of capturing moths will be more extensively used; it will infallibly reveal unexpected varieties in every neighborhood.

Dasychira Lintneri, n. s.

♂. Dark gray, shaded with ochrey at the base of primaries, on the median space and along subterminal line. Basal line dark, narrow, dentate on costa, slightly outwardly projected below median vein. Extra basal space wide. Interior line very distinct, perpendicular, black, toothed on subcostal vein, thence inwardly excavate to median vein at the point of origin of vein 2, thence again excavate to vein 1, diffuse on the margin. Exterior line faint, with whitish included shade. Subterminal line irregular. Fringes blackish, white externally and interrupted with white. Hind wings gray with a mesial shade line followed by whitish and shaded with blackish on external margin at anal angle, where the commencement of a second outer line is indicated; fringe as on fore wings. Body stone gray; antennæ with lengthy pectinations. Beneath the wings are paler; hind wings whitish with a sinuate blackish mesial common line. Body paler beneath. Expanse 40 mil. Centre, N. Y., in May, several specimens in the collections of the State Museum, Mr. Hill and Dr. Bailey.

Euchaetes Spraguei Grote.

The female of this fine species is contained in Mr. Von Meske's collection from Texas. The stripes on costa and internal margin are paler than in the male.

Euclea incisa Harvey.

The female is in Mr. Meske's collection from Texas. The hind wings are paler, more yellowish than in *paenulata*, there is no red stain at the angulation of the green space near internal margin on primaries, the angulation is not so deep and the terminal brown space is narrower. I regard the two as different species. Both forms are in the collection of the Buffalo Society of Natural Sciences and of Mr. Von Meske.

Lithophane Baileyi, n. s.

♂ ♀. Greenish gray and resembling at first sight *querquera* from its color, but with the usual markings of the genus distinct, and with narrower wings. Fore wings rather dark greenish gray. Basal dash black, surmounted by the usual pale shade. T. a. line double. Orbicular concolorous. Reniform large, rounded, with a remarkably bright red stain and shaded with blackish. Median shade blackish, diffuse between the spots. T. p. line double, denticulate, a little more outwardly exerted than in *querquera*, opposite the cell. Subterminal line more or less evident by its fuscous preceding shade. Terminal line black, sub-continuous. Hind wings fuscous with dark fringes. Beneath fuscous with a ruddy hue, a common line and discal spots. Expanse 36 mil. Two specimens taken near Albany in September, by Mr. Geo. J. Bailey, for whom the species is named. One male also from Canada.

This species differs from *querquera* by the narrower wings, with the costal angulation more pronounced, the more grayish color, the scalloped terminal line, less deeply waved subterminal, and the distinct median lines; the secondaries and their fringes are not reddish above.

Apatela (Acronycta) falcata, n. s.

♀. Allied to *tritona* and *grisea*. The external margin is sinuate, not straight, sweeping inwardly below the apices and bulging opposite the median nervules. Fore wings dark purple gray, very like *tritona*. A black basal dash lined above with pale, furcate. Internal margin at base with a patch of light brown scales. Ordinary spots concolorous, faintly outlined, orbicular larger than in *tritona*. Median shade obsolete; median space very wide. T. a. line evident above the basal dash (which slightly exceeds the line) and here blackish; beneath the dash obsolete. T. p. line shaped as in *tritona*, but without the discal incision, blackish, sub-dentate, edged outwardly with brown, inwardly with whitish. Black dash on sub-median fold not extending within the line. Hind wings whitish at base, outwardly vaguely and largely blackish. Fore wings beneath fuscous; hind wings whitish with a faint discal spot and external sinuate macular band. Thorax like fore wings, edged on the sides and behind with light brown. Body beneath whitish; abdomen above light gray. Expanse 35 mil. Illinois, Mr. Thos. E. Bean.

This form differs from its allies in the shape of the external margin of

primaries, the bright brown edging to the thorax, and in the details of the ornamentation throughout.

Mamestra Beanii, n. s.

♂. Allied to *purpurissata* in color, but not quite so large, about the size of *grandis*. Body tufts improminent. Eyes hairy. Antennæ with a white dot at base, simple, ciliate; in *purpurissata* they are serrate and bristled. Purple gray brown, darker than *purpurissata*, median space tinged with reddish. Ornamentation not distinct. Ordinary lines double, lunulate or waved; t. a. line with its outer line more distinct and blackish. Claviform small, black-edged. Orbicular large, paler than the wing. Reniform rather narrow, with an internal shaded ring, stained with ochrey red. T. p. line not much indented below the median vein. Sub-terminal line continuous, nearly even, with a notch on the interspace between veins 3 and 4, indicating the usual W-mark. Apices with a whitish shade. Fringes concolorous. Hind wings dark fuscous with whitish fringe. Beneath paler, fuscous, with the costal and terminal spaces powdered with gray, reddish or purplish. Double exterior common shade lines and faint discal dots. Expanse 45 mil.

I name this fine species for its discoverer, who has collected some rare moths with the present species at Galena, Illinois. Mr. Bean has taken there *Calymnia calami* Harvey, previously only known from Texas; also *Lithophane semiusta*, *Scopelosoma tristigmata*, *devia* and *Pettiti*.

Gortyna rigida Grote.

♂ ♀. I have alluded to this species in the Proceedings of the Ent. Soc. of Phil., 4, 324, as being allied to *cataphracta*, and differing chiefly in the straight transverse posterior line, much as *purpurifascia* differs from *rutila*. It is paler yellow than *cataphracta*, with less purple and dark shades. The stigmata are concolorous. The base of primaries is pale; there is a faint terminal purplish washing in the male. My female specimen does not show but very faint traces of it. The moth is a little slighter than its ally, and can be quickly known by the rigid purple t. p. line not bent opposite the disc as it is in *cataphracta*. ♂ Penn.; ♀ Illinois (Mr. Bean).

The following species is the first Eastern representative of the genus *Ochria*, which contains the European *flavago* and the Californian *sausalita*.

Ochria Buffaloensis, n. s.

♀. The clypeus has a frontal horn, else the insect looks like *Gortyna rutila* and allies. The primaries are brownish red with the extra-basal and subterminal spaces washed with purple. T. a. line geminate, waved, with rather a deep sinus on vein 1, its inner line purple, its outer dark brown red. Orbicular spherical, yellow white. The accessory spots are totally wanting; this last superficial character will separate the moth from any N. Am. species of *Gortyna* allied to *rutila*, known to me or described by Gueneé. Reniform moderate, yellowish, interlaced with a double brown curved line. T. p. line double, nearly straight, not exserted opposite the cell, but prolonged on costa as in *purpurifascia*; its outer line is dark purplish, more diffuse. S. t. line dark, distinct, irregularly dentate. External margin even, bulging opposite median nervules. Veins obscurely purplish. Hind wings pale red, with a mesial straight dark line. Beneath light purple red, with a distinct common line; on hind wings a narrow lunule. Body beneath concolorous with wings; thorax above darker, more purplish. Expanse 40 mil. Miss Mary Walker, Buffalo.

Polia pallifera, n. s.

♀. This species resembles Herrich-Schaeffer's figures of *platinea*. Fore wings whitish gray with the median space washed with olivaceous beyond the olive median shade line. Claviform olivaceous, very large, finely lined with black. Reniform and orbicular gray, shaded with olive, the former white narrowly margined with black. Median lines geminate, of the usual shape. Beyond the t. p. line the wing is whitish gray, cut by the olivaceous shaded s. t. line. Fringes obscure with an interrupted dark line. Hind wings fuscous, paler at base with a sinuate mesial line and a pale subterminal shade. Beneath dirty whitish with double lines and discal marks. Body beneath and abdomen obscure whitish or dusty gray; thorax more purely gray. Expanse 42 mil. Illinois, Mr. Bean.

I cannot identify this with any of Mr. Morrison's descriptions under this genus. It has the fascies of European species of the group. It recalls the Californian *Dian. insolens*, but the eyes are naked.

Homoptera Woodii, n. s.

♂. This species is more strigate than any other known to me. Collar brown with a black mesial line, tipped with gray. Wings dentate, covered with dark strigae. Base of primaries blackish, defined by a broad velvety

black bent interior line. Orbicular wanting. Median space pale anteriorly, blackish posteriorly, where this last color includes the narrow pale reniform with its distinct central black streak, and extends beyond the line narrowly and over costal region to apices. T. p. line fine, black, even, undulate, bent inwards opposite the cell in the centre of its superior exerted portion. Subterminal line defined by the margin of the blackish mesial shading, excavate opposite the cell and more widely so inferiorly. Terminal space pale like the anterior half of median, showing the strigae very plainly. Hind wings pale fuscous, covered with dark strigae, with a more or less determinate mesial line, beyond which the wing is paler. Beneath pale fuscous, strigose; the discal mark indicated on primaries, as also a common mesial line. Expanse 38-40 mil. Several specimens taken at Centre, N. Y., by Dr. J. S. Bailey, and his assistant, Mr. W. C. Wood, of Wayne Co., N. Y., for whom the species is named.

The Albany collectors are studying this difficult genus, and Mr. Hill has called my attention to the fact that *edusa* and *lunata* are possibly sexes of one species.

I am indebted to Mr. Bean for an Illinois specimen of *Homoptera penna* Morrison.

Endropia homuraria G. & R., Tr. Am. Ent. Soc., ii., 80.

Dr. Packard gives this as a synonym of *duaria*, but erroneously. A comparison of our description shows that it applies to a form with "the angles of the external margins of the wings more determinate" than *hypochraria*. Now *duaria* has the external margins rounded. *E. homuraria* is more intensely colored than its allies; beneath it is "intense deep orange, the common line followed externally by a bright purplish shade." The species is well described and cannot be mistaken for *duaria*. It is very near to *hypochraria*; the median lines are angulated as in that species. The discal sinus of the exterior line on the wings above seems to be shallower in *homuraria*, of which I have seen no female specimens as yet.

Lozogramma lactispargaria.

Cidaria lactispargaria Walk., Can. & Geol., 6, 41.

Tephrosia disconventa Walk., C. B. M., 21, 404.

Lozogramma disconventa Pack., 243, pl. 9, fig. 56. Albany (Lintner); Quebec (Belanger).

These different names refer to the same species. The wings are scalloped, not entire, and I accept Dr. Packard's generic determination with hesitation.

Tornos infumataria, n. s.

♀. Larger and stouter than *robiginosaria*, with the wings more elongate. Entirely smoky blackish. Fore wings with two sub parallel, oblique, irregular, black median lines, the exterior partly lined on the outside with whitish, but very faintly so. Hind wings with an indistinct mesial line, which is seen to be scalloped in the best marked specimens; beneath without markings. This concolorous species differs from its ally by the course of the waved median lines on primaries. Expanse 30 mil. June 3, 5; Texas (Belfrage, No. 604).

Aspilates pervaria var. *interminaria* Grote.

♂ ♀. Both sexes of this form, which is smaller than the type and differs at once by the absence of the lines on primaries, have been collected by Mr. Belfrage in Texas (male, June 5, No. 602; female, May 22, No. 653). It is paler than the type and looks like a different species.

LIST OF BOMBYCIDÆ OCCURRING ON THE ISLAND OF
MONTREAL, P. Q.

BY F. E. CAULFEILD AND C. W. PEARSON, MONTREAL, P. Q.

BOMBYCIDÆ.

Lithosiinæ.

Hypoprepia fucosa Hübn. Not common.

Euphanessa mendica Pack. Common; end of June, July.

Crocota Treatii Grote. Very rare; C. W. P.

“ *aurantiaca* Hübn. Very rare; C. W. P.

“ *brevicornis* Walk. Rare.

Utetheisa bella Linn. Rare.

Arctiinæ.

Callimorpha Lecontei Boisd. Common; end of June, July.

Platarctia parthenos Harris. Very rare ; at light, 26th June, C. W. P.

Euprepia americana Harris. Not uncommon ; end of July, August.

Arctia virgo Harris. Rare.

Arctia Saundersii Grote. Not common ; July and August.

“ *nais* Hübn. Very rare.

“ *virguncula* Kirby. Very rare ; June, C. W. P.

Pyrrharcia isabella Abbott & Smith. Exceedingly common ; June, July.

Phragmatobia rubricosa Harris. Rare ; July, 1876 ; May 12th, 1877.

Leucarcia acrea Drury. Common ; June, July, August.

Spilosoma virginica Fabr. Very common ; June, July, August.

Hyphantria textor Harris. Common ; June, July.

Euchaetes egle Drury. Very rare ; bred from larva found on Burdock.
C. W. P.

“ *collaris* Fitch. Not uncommon. June and beginning of July.

“ *Oregonensis* Streck. Rare ; June.

Halesidota tessellaris Smith. Not common ; July, frequents blossoms of
Asclepias cornuti at twilight.

“ *caryae* Harris. Common ; June.

“ *maculata* Harris. Rare ; June.

Dasychirinae.

Orgyia nova Fitch. Not common ; end of July, August.

“ *leucostigma* Harris. Very common ; July and August.

Parorgyia parallela G. & R. Very rare ; Mr. Kuetzing.

Cochliidiinae.

Euclea querceti Pack. Rare ; Mr. Lyman.

Limacodes y-inversa Pack. ? Rare ; Mr. Kuetzing.

Ptilodontinae.

Datana ministra Drury. Not uncommon ; July.

“ *Angusii* G. & R. Rare ; July, Mr. Hibbins.

Notodonta stragula Grote. Rare ; Mr. Hibbins.

Lophodonta ferruginea Pack. Rare ; C. W. P.

Pheosia rimosa Pack. Rare ; taken by Mr. Lyman.

Nerice bidentata Walk. Rare ; Mr. Kuetzing.

Edema albifrons Smith. Not uncommon ; June.

Ædemasia concinna Smith. Larvae, August ; rare.

Coelodasys unicornis Smith. Not common ; July.

“ *cinerofrons* Pack. Rare ; Mr. Kuetzing.

Coelodasys biguttatus Pack. Rare ; Mr. Kuetzing.

Heterocampa manteo Walk. Not common ; June.

Cerura cinerea Walk. Rare ; June, C. W. P.

" — Undetermined. Not common ; June.

Platypteryginæ.

Platypteryx arcuata Walk. Rare.

" *lacertinaria* Linn. Rare.

Attacinæ.

Telea polyphemus Linn. Very common, June, July.

Actias luna Linn. Not common ; June.

Callosamia promethea Drury. Rare ; June.

Samia cecropia Linn. Common ; June.

" *columbia* Smith. Very rare ; one specimen from cocoon found on maple, emerged in-doors May 15th, 1874 ; C. W. P.

Ceratocampinæ.

Hyperchiria io Fabr. Not common ; June.

Dryocampinæ.

Dryocampa rubicunda Fabr. Very rare ; Mr. Lyman.

Lacheiinae.

Gastropacha americana Harris. Very rare ; June 10th, C. W. P.

Totype *velleda* Stoll. Not common ; September.

" *laricis* Fitch. Very rare ; Mr. Bowles.

Clisiocampa americana Harris. Very common ; July.

" *sylvatica* Harris. Extremely abundant ; July.

Hepialinæ.

Xyleutes robinae Harris. Not common ; June.

Stenopis argentimaculata Harris. Very rare ; July, F. B. C.

" *thule* Strecker. Very rare, F. B. C.

REMARKS ON THE SYNONYMY OF NORTH AMERICAN COLEOPTERA.

BY E. P. AUSTIN, CAMBRIDGE, MASS.

Tachinus fumipennis Say (*Tachyporus*) is not synonymous with *T. axillaris* Er., as supposed by Erichson, but differs from that species in several important particulars, as follows :

In *T. axillaris* the upper surface is extremely finely punctured, while

in *fumipennis* the elytra particularly have the punctuation much more distinct ; but the sexual characters will enable the two species to be more readily separated. In *T. axillaris* the males have the fourth abdominal ventral segment triangularly impressed ; the fifth is broadly impressed, with the apex deeply emarginate. In my specimen there is also a slight impression on the tip of the third segment, which is not mentioned in the description of Erichson. The sixth segment is terminated by two long, somewhat curved spines. The males of *T. fumipennis* have the third and fourth segments not impressed ; the fifth is broadly impressed, with the apex only slightly emarginate and the terminal spines of the last segment are less prominent.

The female of *fumipennis* differs from that of *axillaris* as described by Erichson (I have seen no females of the latter species) by having the two external laciniae of the last segment of the abdomen longer and more slender than the intermediate ones.

Tachinus colonus Sachse, from the Southern States, differs by the description from either of the above species, and will probably prove to be distinct. Besides the above, there is at least one, probably two, species as yet undescribed, agreeing in general appearance with these, and which would be confounded with them on a superficial examination.

As the description of Say will apply to all of these species, it is somewhat doubtful which is the one really intended by him ; in fact, it is quite possible that he has confounded two or more species under the name of *fumipennis*, but the species which I have characterized under that name is apparently the most abundant in Pennsylvania, whence Say's specimens came. The description of Say reads "body minutely punctured," a phrase which is not used in the description of several allied species published at the same time, from which it is probable that the species intended by him was more coarsely punctured than the others, which also points to this species rather than either of the others mentioned above.

Languria inornata Rand., *gracilis* Newm. This species has been unfortunate in names ; originally described by Latreille as *L. "bicolor* Fabr.," the name was changed by LeConte to *Latreillii*, and by Crotch to *gracilis* Newm., and *inornata* Rand. placed as a variety ; but it appears that the description of Randall has priority over that of Newman, and the species should therefore bear the name *inornata* Rand.

Hispa collaris Say, Jour. Ac. Phil., iii., 433, is without doubt the

species described as *Odontota Walshii* Crotch, Pr. Ac. Phil., 1873, 81, and the species should therefore be called *Odontota collaris* (Say).

Imatidium 17-punctatum Say, l. c. 435, is not a synonym of *Chelymorpha cribraria* Fabr., as stated by LeConte, Say's Writings, ii., 207, but is the species subsequently described by Crotch, l. c. 77, as *Ch. Lewisii*, which will therefore have to be considered a synonym.

Graptozona plicipennis Mannh. : *Haltica bimarginata* Say ; the description of Say has priority.

Leptura sphaericollis Say, Jour. Ac. Phil., v., 280 = *ruficollis* Say, l. c. iii., 421. Dr. LeConte has already noted, New Series Am. Col., pt. ii., 222, that the species are identical, but not that *ruficollis* has priority.

ON SPECIES OF MELIPOTIS.

BY LEON F. HARVEY, M. D., BUFFALO, N. Y.

I propose to designate by the varietal name *versabilis*, that form of *jucunda* in which the primaries are nearly unicolorously fuscous gray without the white shading on the median space, and without the contrasting black and white of the usual and typical form. Specimens of this are in the collection of the Buffalo Society of Natural Sciences, collected by Mr. Grote in Alabama. Where the t. p. line is at all discernible, it is seen to make the same sharp indentation below the median vein as in the type. The species described by me from Texas under the name *agrotipennis* may be distinguished by the t. p. line not running in so far at this point and making an obtuse instead of a pointed angle on vein 2.

Melipotis sinuatis, n. s.

♀. Belongs to the group of *jucunda*, but is larger, with the fore wings more pointed. Whitish gray ; fore wings crossed by interrupted lines. T. p. line well toward the outer edge, partially obliterate and forming a distinct black sinuate streak from vein 3 (where it approximates to the margin) to vein 1 inwardly. A terminal waved line. Discal mark obliterate, faintly yellowish. Hind wings pure glistening white, with a deep black border discontinued below vein 2. A black dot on the

submedian fold at its outer extremity. Fringes white notched with black opposite the median nervules. Body gray; tegulæ lined within with black. Beneath white with broad black margin to the wings, discontinued below on secondaries; a black discal streak on fore wings. Palpi gray; second joint marked outwardly with fuscous.

Expanse 48 m. m. Aug. 6, Belfrage; No. 646, Bosque Co., Texas. Quite distinct in ornamentation and color from any species known to me.

ON AN AMERICAN SPECIES OF LOPHOPTERYX.

BY LEON F. HARVEY, M. D., BUFFALO, N. Y..

Among the more interesting European Ptilodontid genera not yet recognized as American (the species referred by Walker to *Stauropus* do not, according to Grote, belong to that genus) is Stephens' genus *Lophopteryx*, as restricted by Lederer. To this I would refer a species found by Mr. C. A. Blake in New Jersey, near Philadelphia, and which I do not find elsewhere described.

Lophopteryx americana, n. s.

♂. Eyes hairy; antennæ short, with long pencils of bristly hair from each joint. Primaries with uneven external margin. Bright brown in color, allied to *camelina*, but less rusty or reddish. Nervules interruptedly marked in very dark brown. Transverse anterior line single, forming two approximate obtuse teeth on the cell, dentate below median vein. Transverse posterior line double, obliterate, with included paler shade which traverses the wing obliquely, marked on costal region; a series of ante-apical pale dots; a purplish brown subterminal shade. Median space diffused, shaded with purplish brown, more apparently so before the outer line and inferiorly where the median lines approximate; a terminal brown line, interrupted on the veins, opposite to the extremities of which the exerted fringe is dark brown. Hind wings ochrey, with concolorous fringes becoming brown toward anal angle; a median pale shade, which intersects at internal margin a blackish patch. Beneath yellowish immaculate, the dots on costa of primaries before apices

repeated ; fringes brown. Body rusty brown. Tooth on internal margin of primaries not prominent. Expanse 36 m. m. Collection Buff. Soc. Nat. Sci.

This seems to be a shorter and broader-winged form than the European, in which it would conform to Dr. Speyer's law of variation in the Noctuae. The outer line is less distinct than in the European species, of which it may be a modification.

ON PSEUDOHASIS HERA (HARRIS).

BY A. R. GROTE, BUFFALO, N. Y.

Through the kindness of Lieut. Carpenter, I have received from Yellowstone Park a ♂ specimen which agrees with Mr. Walker's description of *pica* (B. M. Lists, 1318), and must be the same, although outside of the common black outer fascia the wings are tinted with yellow, while appearing white at first glance. But Walker's description seems identical with Harris' *Hera*, and his specimen is from Doubleday also. Probably the same specimen has been made the type of both species. Walker's locality, "United States," is indefinite, and probably not as originally given by Doubleday. Further comparisons are needed to settle the differences between *eglanterina* and *Hera*, which I have considered (Am. Phil. Soc., 1874, p. 4) as specifically identical.

It is not necessary, at this time, to analyse Audubon's plate ; for the two names, *Hera* and *pica*, are founded on *specimens*, and no name is attached by Audubon or others to the original figures. I would correct the synonymy of the two forms as previously given by me.

Pseudohasis G. & R. (1866).

(Type : *Saturnia eglanterina* Boisd.)

1. *Pseudohasis Hera* (Harris) G. & R., Ann. Lyc. N. Hist., N. Y., 8, 377 ; *Saturnia Hera*, Rep. Ins. Mass., 286, 1841 ; *Hemiluca pica* Walk., B. M. Lists, 6, 138.

Hab. Rocky Mountain Region.

2. *Pseudohasis eglanterina* (Boisd.) G. & R., Ann. Lyc. N. Hist., N. Y., 8, 377 ; *Saturnia eglanterina* Boisd., Ann. Soc. Ent. Fr., 2nd Ser., x, 323 ; *Telea eglanterina* H.-S., Exot. 60, fig. 445.

Hab. California.

CATALOGUE OF THE LEPIDOPTERA OF AMERICA NORTH OF MEXICO.

Part I—Diurnals ; by W. H. Edwards.

Published by the American Entomological Society, Philadelphia, 8vo., pp. 68. Price, \$1 ; interleaved for additions, \$1.30.

This work of Mr. Edwards' is conservative in its character, and as such is most refreshing ; after having tried in vain to fathom the innovations with which we have for the past few years been perplexed, this excellent catalogue comes to our rescue, and will, we feel sure, be appreciated by all who do not believe in the excessive multiplication of genera and their establishment on minute and often variable characters. Here the dear old familiar names are nearly all in their places again, and we go back to the time-honored method of heading our collections with *Papilio*, and embracing in it some 22 species. For ourselves, we have for some time past been literally at sea in reference to names for butterflies, wandering about without chart or compass to direct us ; we scarcely knew the name of any species, and didn't expect ever to have the time or disposition to master the new names proposed, and hence we have been so discouraged that we have done really nothing to our collection of butterflies for a long time past. We are not disposed to object to changes in nomenclature where it can be made to appear that a *necessity* for such modifications exists, but we have been unable to see any good reason for adopting the wholesale changes which have been proposed, and we believe that the great bulk of working Entomologists hold the same view. With a catalogue now more to our mind, sufficiently progressive, and, at the same time, a most convenient help, we shall be able to classify our species under genera we can comprehend, and go to work with a will again.

In the general arrangement the author, while adopting and incorporating some of the work of later systematists, adheres mainly to the order of Doubleday and his associates in the "Genera of Diurnal Lepidoptera," and where the genera have numerous species, as in *Colias*, *Argynnis*, *Thecla*, *Lycaena*, *Pamphila*, &c., they are for the sake of convenience divided into sections. In crediting genera the author strictly follows the rules adopted by American Entomologists at the recent meeting in Buffalo, and appends the name of the party who first gave the genus a proper definition. For this reason Hübner's genera are excluded

and two of the genera made by Mr. Scudder in the Hesperidæ, *Amblyscirtes* and *Pholiosora*, have been credited to Dr. Speyer because his definition of them is the first published. With regard to Mr. Scudder's genera, we think he should have had credit for them. We all know what pains-taking and unsparing effort he has bestowed in laboring to introduce what he conscientiously believes to be needed reforms in Entomological nomenclature, and although the present generation of Entomologists is not disposed to adopt such wholesale reform as he proposes, he is undoubtedly *deserving of full credit* for any of his material which may be used. His work on New England Butterflies, in which all these genera are minutely defined, has long been written, but its expensive character has been an obstacle in the way of its publication. Under these circumstances, *which are very exceptional*, we regret that Dr. Speyer's references of these genera to Scudder have not been followed.

There are 506 species enumerated in this list, embraced in 64 genera. There are also references by the use of a system of special signs to all writers who have treated of the preparatory stages of our butterflies, no matter how briefly; we regard this as an excellent and valuable feature in the work. The catalogue is in every way well got up, and we hope all our readers will procure a copy of it, and if, after they have given it a careful perusal, they think as well of it as we do, they will set to work and arrange their collections in accordance with it, feeling profoundly thankful to the author for the timely relief he has afforded.

NEW SPECIES OF NOCTUIDÆ.

BY W. V. ANDREWS, BROOKLYN, N. Y.

Acronycta Walkeri, n. s.

F. W., upper side—Wing-stretch,* 1.5 in. General color brownish gray. The costal edge has ten small, dark brown, irregular marks, and

* Perhaps I ought to apologize for coining a word in the above description—"wing-stretch." I hold it, however, to be a legitimately formed word, and I believe that in giving a description in English no foreign word or abbreviation should be used, if an English word, with the same meaning, can be found or formed.

four of these, those nearest the base of wing, are nearly enclosed by a dark brown, semi-circular line, which also encloses a basal patch, not distinct in color from the rest of the wing. Fringe of the wing light gray. A row of seven or eight dark brown, oblong spots on outer margin, probably lying betwixt the nervules, and very distinct. The "Acronycta mark" is almost of the shape of an anchor. Reniform stig. light ochrey brown; orb. stig. light gray.

All the transverse lines are very dark brown, edged interiorly with white or light gray, very zigzag; the subterminal and elbowed lines coalesce.

H. W., upper side—Light gray, nearly white, with a small discal brown spot, probably sometimes absent. Fringes and outer marginal spots as in f. w., except that the spots are less distinct, and almost form a line. Under sides of both wings light gray, growing darker toward the margins. The marginal spots as on the upper side. Fore legs annulated; the others gray with dark patches. Head, antennæ, patagia and thorax dark brown. Abdomen of a lighter color, but slightly darker than its under side, which, as well as the under thorax and palpi, are concolorous with the under side of wings. Last joints of palpi dark brown, and it is very probable that in some specimens all the "dark browns" may be "blacks."

With the exception of *funeralis*, this is the prettiest *Acronycta* that I know. N. J., Coll. W. V. A.

Orthosia lutosa, n. s.

F. W.—Wing-stretch 1.5 in. Color brownish gray, slightly darker on the outer margin, where the nervule interspaces are ornamented with seven dark brown, Y-shaped marks, sometimes confluent. A black or dark brown spot at apex of discal cell. Under side rather lighter in color. A brown crescent mark open towards costal edge—2.5 in. from apex.

H. W.—Basal space rather lighter in color than the f. w.; marginal space nearly as dark. A small, faint, brown discal spot. Under side concolorous with upper, the discal spot much more distinct. All fringes brownish gray and short.

Antennæ concolorous with f. w. Head, thorax and palpi densely clothed with light gray hairs. Abdomen .5 in. long, concolorous with h. w., darker underneath. N. J., Coll. W. V. A., 3 specimens.

CORRESPONDENCE.

THE HESSIAN FLY, JOINT WORM AND WHEAT MIDGE.

Specimens of these destructive insects in all their stages of maggot (*larva*), chrysalis (*pupa*) and fly, are earnestly desired by the undersigned from all parts of the country, particularly the south and west, in order that he may ascertain their distribution and study their natural history, with reference to their ravages. Specimens may be sent alive in stout paste-board boxes, or better, in tin boxes. The soft maggots should be forwarded in vials containing cotton soaked in alcohol, by mail. It may be remembered that the Hessian Fly and Joint Worm live near the roots of the wheat plant, causing swellings in the stalk, while the Midge lives in the ear. Accounts of these insects, with a map showing their distribution in the United States, will soon be published by Hayden's United States Geological Survey of the Territories, and extra copies of the report may be obtained of the author. Address parcels containing specimens and requests for the report to

A. S. PACKARD, JR., Salem, Mass.

I have great pleasure in informing you that a new Entomological Society has been formed in this city, under the title of "The Long Island Entomological Society." The following are the officers:—

Rev. Geo. D. Hulst, President; John Akhurst, Vice-President; Thos. Stearns, Treasurer; P. Elbert Nostrand, Rec. Secretary; W. V. Andrews, Cor. Secretary; Fred. Baldwin, Librarian; Chas. Leng, Curator.

W. V. ANDREWS, Cor. Sec'y L. I. E. S.,
187 State St., Brooklyn, N. Y.

I captured a *Meloe* on the 17th of April. I have also in two instances this spring found a male *Cicindela purpurea* paired with a female *C. vulgaris*. May not this sort of thing account for some of the remarkable variations among the *Cicindelidae*? J. A. MOFFAT, Hamilton, Ont.

Notes on "Fondness of Larvæ for Water" would have appeared in this issue, but we have mislaid the letter containing the name of our correspondent. Would he kindly furnish it again?—ED. C. E.

The Canadian Entomologist.

VOL. IX.

LONDON, ONT., JUNE, 1877.

No. 6

ON A NEW CANADIAN CRAMBUS ALLIED TO CONCHELLUS.

BY A. R. GROTE,

Director of the Museum, Buffalo Society Natural Sciences.

Mr. Wm. Saunders has collected a species of *Crambus*, which is apparently unnoticed by Prof. Zeller or Dr. Clemens, who have written most frequently on our American species. The new species, which I call *C. interruptus*, is very easily recognized and has been figured by Prof. Townend Glover on his Plates of Lepidoptera. The head is white; palpi inwardly and beneath white, outwardly dark brown. Thorax white, patagia bright brown. Hind wings and abdomen pearly gray. Fore wings bright brown with a longitudinal white median band obliquely interrupted at the middle of the wing by the ground color. Beyond is a white block on the outer half of the wing, with its inner and outer edges inwardly oblique and its upper edge longer than its inferior margin. Beyond this, before the external margin, is a white band, following the shape of the wing and discontinued above and below. The brown space between this band and the block of white is narrower above than below. In this simply marked species the whole ornamentation seems to be limited to a longitudinal white band, widening outwardly and interrupted mesially and subterminally obliquely by the brown ground color of the wing. There is a sub-obsolete series of minute terminal black points; fringes fuscous, interrupted with white at the middle of the wing and again near internal angle. Beneath the hind wings are almost white; the fore wings shaded with fuscous.

When we compare *C. interruptus* with the European *C. conchellus*, we see that the pattern of ornamentation is very similar in the two forms. The American species differs by the white band before the external margin. In *C. conchellus* there is merely the basal vitta and the outer block of white

scales, and this latter is much larger than in *C. interruptus*. The hind wings are darker in *C. conchellus*, and the thorax and head not so purely white.

C. interruptus has also been taken at Grimsby, Ont., by my kind friend, Mr. J. Pettit. I have seen no specimens from New York State yet, but it will probably occur with us. Its average expanse is 21 mil. For a fine series of *C. conchellus* I am indebted to Prof. Zeller, of Stettin.

A NEW GENUS OF APHIDÆ.

BY J. MONELL, MISSOURI BOTANIC GARDENS, ST. LOUIS, MO.

Colopha, nov. gen.

Antennæ six jointed, wrinkled transversely, and almost moniliform.

Front wings with three discoidals; the cubital once-branched.

Hind wings with one oblique vein.

Wings in repose, usually horizontal.

C. ulmicola (Fitch)—*Byrsocrypta ulmicola* Fitch, N. Y. Rep., ii., 347. *Thelaxes ulmicola* (Walsh), Proc. Phil. Ent. Soc., i., "American Entomologist," vol. i., 108.

The above-mentioned species was originally described by Dr. Fitch (N. Y. Rep., 347), who had not seen the winged form, as *Byrsocrypta ulmicola*. The winged individuals were first described by the late Prof. Walsh, who removed it to "*Thelaxes* Westw." Judging alone from the original description of *Thelaxes* in the "Synopsis of British Genera of Insects," it would be almost impossible to say whether this insect is a *Thelaxes* or not; but Prof. Westwood states in his "Arcana Entomologica" (ii., p. 64) that his genus *Thelaxes* is synonymous with *Vacuna* Kalt.; and since, in addition to other differences, *Vacuna* has five-jointed antennæ, it is evident that our insect can not belong to that genus, and as I can find no generic description which will at all agree with this, either in our American authorities or in Koch, Kaltenback and Passerini, I have presumed it to be new and described it accordingly.

The bibliography of this species really seems like a "Comedy of Errors." Dr. Fitch placed it in a wrong genus; Mr. Walsh removed it to *Thelaxes* and refers to N. Y. Rep., ii., 257, instead of ii., 347. In the "American Entomologist" it is indexed for p. 224, instead of p. 108. Mr. Packard (Guide, p. 525) mentions *Thelaxes ulmicola* Walsh, while on the next page he speaks of *Pemphigus ulmicola* (Fitch), and refers to figure 525, which is from an electrotype of the identical wood-cut first published by Messrs. Walsh and Riley in the "American Entomologist," under the name of *Thelaxes ulmicola* Fitch. Mr. Packard's figure 525 is, therefore, evidently my *C. ulmicola*, and, indeed, I have so far failed to find any other mention of a *Pemphigus ulmicola* Fitch.

NEW PYRALIDES.

III.

BY A. R. GROTE,

Director of the Museum, Buffalo Society Natural Sciences.

Botis vibicalis Zeller, Beitr. ii., 8, Taf. iii., fig. v.

By error in text "*ribicalis*;" correction pages 9 and 131. One of the smallest forms, looking like a minute Heliothid. Fore wings pale yellow with a purple, oblique inner band and an outer of the same hue running parallel with external margin and connected along internal margin with the first band. Hind wings fuscous. Texas (Belfrage, No. 407), August 20th.

Botis nasonialis Zeller, Beitr. ii., 9, Taf. iii., fig. 6.

Texas (Belfrage, No. 406), June 15th.

Botis coloradensis G. & R.

Also from Texas, taken by Belfrage April 25 (No. 379). This species may be known by the white immaculate secondaries. The lines on the primaries are ochreous; in the colored copies of the original plate these lines are incorrectly left black.

Botis atropurpurealis, n. s.

Allied to *vinulenta*. Fore wings of an obscure reddish brown with a purple cast. At first sight appearing immaculate, but the exterior line can be made out by its being followed by scattered yellowish scales; it is similarly shaped to that of *vinulenta* (= *signatalis* †), but not angulated on submedian fold. The stigmata are not obvious. The anterior line is partially shown in the same way as the outer line. Hind wings fuscous, paler at base; fringes paler and narrowly interlined. Head and thorax like fore wings. Beneath the body is silky whitish. Wings beneath fuscous with a slight lilac reflection, without obvious markings except on secondaries an indication of a mesial line.

Expanse 15 mil. Texas, Belfrage (No. 362), Sept. 12.

Botis onythesalis Walk.

Larger and with longer body than *sumptuosalis*; similarly colored. Orange yellow; terminal space on both wings shaded with purplish fuscous. Median space on primaries variably washed with purple red. Lines purple, shaped as in *sumptuosalis*, but the outer line running in more deeply on vein 2. Beneath the fore wings are less brightly colored, with the fuscous terminal shade repeated and the discal marks indicated. Above the secondaries show an oblique mesial line, and beneath this is reflected. Body above orange yellow, beneath with legs whitish.

Expanse 19 mil. Hab. Texas, Belfrage (Nos. 364 and 365), March 26, May 25.

Botis Harveyana, n. s.

A small species more slender than *communis*, with pale brown primaries, the exterior line fine, blackish, obsoletely denticulate, rather suddenly drawn in at vein 2, thence back again and angulate before the margin. Outer spot large, annulate. Inner spot obsolete. Before the fringes, which are faintly interlined with pale and are discolorous, there is a distinct sinus of dark points. Hind wings paler than primaries, washed outwardly with the same brown as primaries, with a distinct discal dot and median line. Beneath more ochreous, with the discal dots double on hind wings; a common exterior line; on the primaries the veins are partially darker marked; terminal points very distinct and continuous. Head, palpi and thorax above pale brown, beneath concolorous with under surface of wings glistening.

Expanse 18 mil. New York, L. F. Harvey, July 27 ; Texas, Belfrage (without number, among *communis*), Sept. 25.

Botis flavidissimalis, n. s.

Size moderate. Entirely bright deep yellow, saturate with this color above and below. Costal region of primaries at base a little deeper tinged, and the thorax in front a little ochreous. Under surface of body and legs whitish ; fore tibiae marked with brown ; palpi dark ochreous, white beneath. Fore wings with two stigmata, dark, nearly solid, the outer annulate. Lines blackish, fine, dentate ; the outer line much bent in to below the outer spot, thus differing from *citrina*, and continued on secondaries. No subterminal line. A terminal series of ochrey points on both wings. Fringes pale yellow. Eyes with a white line. Beneath the costa of primaries is shaded with ochreous ; both stigmata repeated ; a common exterior line.

Expanse 19 mil. Texas, Belfrage (No. 383), June and August.

Botis catenulalis, n. s.

Larger than *ventralis*. Entirely brown, not opalescent. Fore wings with the exterior line not greatly indented below vein 2, and followed by a series of dull yellowish spots opposite the scalloping of the line. Discal spots annulate ; all three present ; the inferior (claviform) spherical. The transverse anterior line faintly preceded by a pale shade. Hind wings paler than primaries, especially towards internal margin, crossed by a line corresponding to the outer line of primaries, not much indented, continuous, lunulate, the indentations filled in with pale spots as on fore wings. An even dark brown terminal line ; fringes paler than wing, whereas on primaries these are concolorous. Beneath paler than above with the outer common line distinctly repeated as well as the stigmata on fore wings. Head and palpi brown above, white beneath.

Expanse 26 mil. Hab. California ; Coll. Buff. Soc., from Mr. Meske.

Botis fracturalis Zeller.

Collected by Dr. Shannon in Southern Texas ; also by Belfrage, Nos. 385 and 384 ; varies in color of fore wings as does *argyralis*.
March and April.

Eurycreon communis Grote.

Varies excessively in color. Dark wood brown or fuscous specimens

were collected by Belfrage (Nos. 372, 375) on the 25th and 26th of March. On the 5th of November one with red brown primaries. Clypeus with frontal protuberance; a darker form than *vautalis*, formerly incorrectly referred by me to *Botis*.

Botis tatalis, n. s.

A single male specimen (No. 659, Nov. 7). The hind wings are yellow ochre with a subterminal dark line and a trace on the middle of the wing of a mesial line. A discal spot near the base of secondaries, which beneath are ochrey and immaculate. Primaries and thorax dark brown; ornamentation like *communis*, than which this is larger winged. Subterminal shade indistinct; fringes darker than the wing. Beneath fore wings ochrey with a trace of the external line at costa; outer discal spot large, black, inner quite small. Head and thorax above brown; beneath with the legs, pale ochre. Hind wings appear wider and very different in color, almost yellow above, as compared with G. & R.'s figure of *posticata*. I have not their type, but from recollection it is not the present species, which may be known by the subterminal shade on the ochre-yellow hind wings, which contrast with the brown.

Expanse 20 mil.

Of all the species of N. Am. Pyralides described by Grote & Robinson, *Botis posticata* is the only one I do not recognize in the Collection of the Buffalo Society of Natural Sciences. The type may be in Philadelphia or New York. I thought for some time that *communis* might be identical with it, but it will need a comparison of specimens to decide the matter.

Botis penumbralis, n. s.

Allied to *terrealis*, but much larger. Of the same silky gray-fuscous, but stained with yellowish on the veins, the costal margin of fore wings and narrowly along the terminal border of both wings. Abdomen and thorax above yellowish; head, palpi, fore legs and pectus in front obscure yellowish. Thorax and abdomen silky whitish. On the wings the lines are diffuse. No subterminal shade, no stigmata, the cross-vein being indicated by yellow scales. The lines are fuscous, sub-dentate, shaped much as in *terrealis*, but without costal accentuation. This is a more robust species than *terrealis*, and its ornamentation more simple. Beneath the wings are pale silky fuscous, reflecting the common outer line. Fringes pale fuscous, not interlined.

Expanse 31 mil. Ohio (Mr. Drury).

Botis socialis, n. s.

Fore wings triangulate, widening outwardly more than usual. Ground color pale yellow washed with red, especially beyond the outer line, where a broad, diffuse, blackish subterminal band forms the most prominent marking of the wing and appears purplish from overlying bright scales. Transverse lines blackish, linear, trembled. Stigmata small, both solid. Outer line not strongly indented below median vein. Fringes pale, silky, very faintly interlined. The terminal edge of the wing is narrowly red. In one specimen the red shades are more or less absent, leaving the subterminal shade blackish. Hind wings pale yellow, with the subterminal broad shade more or less obviously continued; fringes pale. A fine mesial line. Beneath very pale sericeous yellow, with the subterminal shade and fragments of the exterior line repeated. On primaries discal marks repeated. On fore wings in one specimen the fringe is a little fuscous above. Body yellowish, paler beneath.

Expanse 25 mil. Canada, Mr. Saunders; Buffalo, Mr. Zesch.

Botis allectalis, n. s.

♂. Size of *communis*, but with more pointed primaries and longer abdomen. Gray over fuscous, with a pale ochreous discal patch on the median space surrounding the stigmata. These latter distinct, solid, dark fuscous, the oblique orbicular probably sometimes with paler centre, as it is faintly so on one wing. The lunate reniform followed by a fuscous shade margining the ochreous patch outwardly. T. p. line denticulate with a whitish included shade, setting out the line, not much indented below median vein. The gray scales overlay the fuscous, and when the wing is rubbed are first lost. The costa to t. p. line is ochrey fuscous. Hind wings translucent fuscous with pale line and darker borders. Head and appendages ochrey fuscous. Beneath paler with stigmata and exterior common line apparent.

Expanse 23 mil. Belfrage (No. 445), May 12, Bosque Co., Texas.

TINEINA.

BY V. T. CHAMBERS, COVINGTON, KY.

HELIOZELLA.

H. ? æsella. N. sp. ?

I am but imperfectly acquainted with this genus, knowing it only through the Nat. Hist. Tin., vol. xi.; and the plan of that work does not seem to admit of details of structure. If it is equivalent to *Aechmia*, *Perittia*, *Tinagma* and *Douglassia* combined, as those genera are limited in Ins. Brit., v. 3, then the proper place for this species is in it. But if, as I conclude from the account in Nat. Hist. Tin., it is the equivalent of *Tinagma* alone, and the other groups above mentioned are good, distinct genera, then this species, while possessing affinities with all, would be out of place in either. In Ins. Brit. Mr. Stainton places in *Tinagma* three species, *sericiellum*, *stannecellum* and *resplendellum*. In Nat. Hist. Tin. these three species, with the comparatively new species *lithargyrella* Zell. and *griseszens* Staint., compose the genus *Heliozella*, none of the species placed in *Aechmia*, *Perittia* or *Douglassia* in Ins. Brit. being placed in it. Prof. Zeller has since (Beit. z Kent, May, 1873) described from Texas a new species, *H. gracilis*—the only species heretofore met with in this country. Possibly *æsella* may prove to be identical with *gracilis*, but I think not, and the particulars in which they differ will be indicated below. Some of these points of difference are structural, based upon the supposition that *Heliozella* is identical with *Tinagma*, as characterized in Ins. Brit., v. 3. For instance, in *Tinagma*, as there characterized, *there is no tongue*, the *ciliæ are long*, the antennæ short, stout and *very much compressed*. In the species before me the tongue is as long as the thorax and naked (as in *Douglassia*); the antennæ as stout and thick, not half as long as the fore wings, *not compressed* (unless by “closely compressed” is meant that the joints are closely set), *they are microscopically pubescent, and with a minute basal joint as in Aechmia*; and the ciliæ have no unusual length, but are rather coarse. I do not detect the marked demarcation between the wings and the ciliæ which Prof. Zeller describes in *H. gracilis*, nor are the wings posteriorly so much narrowed and pointed as from his description I infer them to be in that species. Certainly the hind wings are not so much so as in either *D. ocnerosomella* or *T. serici-*

ellum, as these are figured in Ins. Brit., *though the neurulation is exactly that of ocerostomella*. I have not examined the neurulation of the fore wings, but the shape is very nearly that of *sericiellum*, *loc. cit.* The labial palpi are those of *Tinagma sericiellum*; and the maxillary palpi are about equal to the first joint of the labial.

The ornamentation is that of *Tinagma*, and of the other genera above named as well. There are the usual two silvery white dorsal spots, one near the base, the other at the anal angle; the latter *is not a triangle*, as it is described in *gracilis*, or if it is triangular, the apex is very obtuse; it points a *little* obliquely backwards; the other lies parallel to it, pointing also a little backwards, is of the same length but narrower, and reaches the fold. Hind wings pale fuscous; ciliae grayish fuscous. Otherwise the entire insect is of a rich brown, but glittering so with metallic reflections that it is difficult to get a good view of its true color. These reflections from the wings, thorax and abdomen are brassy, or rather bronze; from the head, palpi and under surface of the abdomen, silvery or like burnished steel; the antennae are of the same color with the fore wings, the legs are a little paler. Wing expanse, $2\frac{1}{2}$ lines.

Described from a single specimen taken April 24th, resting on the body of an apple tree (on the edge of a forest, however,) near Covington, Kentucky. I did not observe anything peculiar in its position in the hasty glance which I gave it, and, indeed, was under the impression that it was an early specimen of *Aspidisca splendoriferella* Cham. In Europe species of *Heliozella* are said to appear flying in hot sunshine in May and June. In ten years of diligent observation, I have never met with a mine resembling that made by *H. resplendellum* (the only species of which the larva is known), except in July and August, 1875, in the region of Mammoth Cave. There a mine was not uncommon in Chestnut leaves. It was a narrow line beginning always by the side of a lateral rib, running thence towards but not to the edge of the leaf, then crossing over the space to the next rib, and passing along beside it down to the midrib, which it entered and burrowed along down it towards the stem, emerging from the midrib through a little slit, looking like two minute half parted lips. I never saw the larva, and saw no trace of its having left the midrib, and cut out from the cuticle of the leaf an oval case in which it might descend to the ground and pass the pupa state like *H. resplendellum*, in *Alnus* leaves.

I believe I have already somewhere alluded to the connection which

exists, or which I fancy to exist, between these small genera of *Glyphipterygidae* and the *Elachistadae* of Mr. Stainton's classification. I can not now refer to the place where I have alluded to the subject, nor am I altogether certain that I have published the observations which then suggested themselves on this subject, as at that time I only knew the *Glyphipterygidae* through the writings of other Entomologists. But it certainly seemed to me that the larvæ of the above-mentioned genera of small species being unknown, there was nothing in the structure of the imago to exclude them from the *Elachistadae*, though the larger genera, *Ascalepia*, *Glyphipteryx*, etc., were allied sufficiently nearly to the *Gelechidae*. But such species as *Æchmia dentella* and *Lithariapteryx abronizella* unite these small genera and *Glyphipteryx*, so that they cannot be placed in separate families, though the apodal larvæ of *Antispila*, *Heliozella*, etc., do not offer any strong affinities with either *Glyphipterygidae* or *Elachistadae*. While, therefore, it is true that these small genera can not be separated from *Glyphipteryx* and placed in a different family because of being so connected, nevertheless, taken by themselves, in the imago, they still seem to me to show strong affinities with the *Elachistadae*; and, indeed, the older Entomologists placed the European species of *Antispila* in the genus *Elachista*. Do the *Glyphipterygidae* afford a passage from the *Gelechidae* to the *Elachistadae*?

DESCRIPTION OF A NEW TEXAN ANISOTA.

BY LEON F. HARVEY, M. D., BUFFALO, N. Y.

The following species, new to the fauna of the United States, have been collected by Mr. L. Heiligbrodt, in Bastrop Co., Texas, and the types are contained in the beautiful collection of my friend, Mr. Otto Meske, in Albany.

Anisota Heiligbrodti, n. s.

♂ ♀. The antennæ of the male are broadly bipectinate, except at the tips; those of the female are simple. This species differs from its allies by its purely gray color and by the fore wings being covered by two nar-

row blackish lines. The first of these is sub-basal, irregularly sinuous, produced on the disc; the second is regularly scalloped, interspaceally waved, and runs from apical third to internal margin. The wide median space has a more purely whitish ground, while the wing everywhere is thickly dusted with dusky cells. The usual discal mark consists of two superposed white spots dusky ringed. Hind wings of the same gray, with the disc bright rose color, enclosing a large round black discal spot and outwardly limited by a faint mesial band visible towards anal margin. Beneath of the same gray, with the round black discal spots repeated on both wings; the primaries alone are rose color at base, and there is a trace of a common extra-mesial band. Body gray with the sides of the abdomen tinged with roseate.

Expanse, ♂ $2\frac{1}{8}$ inch.; ♀ 3 inch.

Anisota Heiligbrodti, which is named for its discoverer, approaches certain southern species in form, which have been referred by Dr. Boisdual to *Adelocephala*.

NEW SPECIES OF ORTHOPTERA.

BY G. M. DODGE, GLENCOE, DODGE CO., NEBRASKA.

Caloptenus angustipennis, n. sp. .

General color light brown. Upper part of pronotum and hind femora with a reddish tinge. Face sometimes mottled. Antennæ light brown infuscated apically. The usual black band behind the eye broad and distinct, and reaching last division of pronotum, bounded below by a narrower white stripe. A broad white stripe from base of elytra connects with a white stripe at insertion of posterior femora, forming a right angle. Outside of hind femora is crossed by two indistinct dusky bands that extend upon upper edge. Lower sulcation reddish. Knees black. Hind tibiae blue. Elytra light brown with very small black spots in the disk.

Frontal costa depressed at ocellus. Head but slightly elevated above pronotum. Foveola of vertex scarcely depressed. Carinae of pronotum nearly obsolete; the median cut by three transverse incisions. Hind lobe of pronotum slightly rugulose. Elytra extending beyond abdomen, un-

usually narrow. ♂ cerci small, narrow, straight, tip rounded and sulcate. Tip of abdomen notched, as in *C. spretus*, but the notch is wider. Length ♀, .95; ♂, .90 inch. Elytra ♀, .75; ♂, .70 inch. Hind femora ♀, .56; ♂, .50 inch.

Banks of the Elkhorn River, Dodge County, Nebraska. August and September.

Caloptenus volucris, n. sp.

Head unusually large. Frontal costa slightly depressed at ocellus, broadening below. Punctate above ocellus. Pronotum slightly constricted in middle. Median carinae distinct, but slight; cut by last transverse incision. Lateral carinae distinct only on posterior part of pronotum. Elytra longer than abdomen. Posterior femora equals abdomen in length. In dried specimen the face is brown, occiput and pronotum a shade lighter. The usual black stripe behind eye to last lobe of pronotum, and testaceous spot below. Elytra light brown, darkest at base, unspotted. Oblique yellow stripe on side of body. All the femora reddish yellow above, the posteriors black at tip, with three brownish patches on upper edge. Hind tibiae blue with black spines, and narrow, black, basal annulation. Under side of thorax and abdomen yellow. Antennae red, darker at tips. Terminal segment of abdomen pointed. Cerci broad at base, rapidly tapering to the middle. The apical half scarcely tapering and ending in a blunt point. Length ♂, .85 inch. Elytra ♂, .70 inch. Hind femora, .45 inch.

Rare and local so far as observed. Habitat, Glencoe, Neb. Time of appearance, September. This species is very close to *Pezotettix autumnalis* Dodge, and differs chiefly in the length of the elytra and wings.

Caloptenus plumbum, n. sp.

Frontal costa sulcate only at ocellus. Vertex slightly sulcate. Median carina of pronotum distinct, cut about the middle by last transverse furrow. Hind border of pronotum angled. Elytra and wings extend beyond the abdomen. Cerci broadest at base and straight until near the apex, when they bend upward—the upper side with a gentle curve, the lower making an obtuse angle—and end in a blunt point. Tip of abdomen rounded.

Color dark inclining to blue. Pronotum with a red, longitudinal

median stripe. Black band behind eye, broadest on pronotum, ending at last sulcus. Yellow spots behind the eye on both sides of black stripe and below the same on side of pronotum. Cheeks bordered behind with yellow. Sometimes face yellow, mottled with blue. A yellow spot at base of antennæ, and a yellow stripe following the lateral carinæ of pronotum on hind lobe, runs obliquely across base of elytra to insertion of hind femora. Elytra brown, with a few dusky dots along the disk. Wings tinged with blue. Upper outside face of hind femora dark blue, the upper edge crossed by the usual dark bands. Hind tibiæ red with black spines. Antennæ light red. Entire under side of insect yellow.

Length of body ♀, 1.00 inch. ; ♂, .85 inch. Of hind femora, male and female, 0.50 inch. Elytra ♂, .75 ; ♀, .80 inch.

Two ♂, four ♀. Found in low grounds during the month of Sept., at Glencoe, Nebraska. Possibly a local variety of *femur-rubrum*.

Pezotettix abditum, n. sp.

Medium size. Frontal costa punctured, depressed at ocellus. Vertex sulcate. Occiput faintly carined. Median carina of pronotum slight, cut by last transverse incision. Lateral carinae obtuse. Elytra short, oval, pointed. Last segment of male abdomen acuminate. Cerci short, broad at base, of equal width from middle to apex. Tip broadly rounded.

General color dark brown. Antennæ red, darker at apex, sides of face and pronotum yellow. The usual black stripe behind the eye ; narrow on pronotum and ending at last sulcus. Elytra dark brown, spotted obscurely and irregularly with black. Hind femora dusky without, with three indistinct black bands that cross over the upper edge and appear on the inside, the one nearest the knee usually broadest and crossing the inner face. Inside and below yellow. Hind tibiae red, spines black. Under side of whole insect bright yellow.

Length of body ♀, .70 inch. ; ♂, .65 inch. Elytra ♀, .27 inch. ; ♂, .23 inch. Hind femora ♀, .45 inch. ; ♂, .40 inch.

Three ♀, three ♂. Taken at Glencoe, Nebraska, where it is usually abundant in August. It occurs upon hill sides, near damp ground, among the rank herbage common in such situations.

NOTES ON LIMENITIS PROSERPINA AND ARTHEMIS.

BY W. H. EDWARDS, COALBURGH, W. VA.

Last fall I obtained a few eggs from a female *L. proserpina*, in Sept., while in the Catskills, and raised eight larvæ to hybernation, which took place after third moult. This spring I have carried four of these to maturity with the following results: The first chrysalis gave butterfly this morning (April 29th), a male *arthemis*. For some hours before the emergence the white band of *arthemis* was distinctly seen through the wing case. The second was but a few hours younger and during this afternoon has given *proserpina* male. I expected this, as here there was no white band on the wing case. The third and fourth produced *arthemis*, making three *arthemis* and one *proserpina*.

After hybernation the fourth and fifth moults took place. As *disippus* undergoes five moults in same way, I presume *ursula* will be found to, and that it is the rule for this genus, in this country at least. We know that *proserpina* is found flying with *arthemis* in the White Mountains and Catskills, and probably in the Adirondacks. But I have never seen it from Canada, though *arthemis* roams over British America from Nova Scotia to low down Mackenzie's River. Can you or can any of your readers tell me whether this form (*proserpina*) has been taken in Canada, or British America, and where, if at all? I wish to get the northern limits of the form, preparatory to illustrating the species in Butterflies N. A. I should be glad to receive letters on this matter from any one who can give the information I seek.

A NEW GENUS AND SPECIES OF GEOMETRÆ.

BY A. R. GROTE, BUFFALO, N. Y.

Meskea Grote (n. g.)

This genus of *Geometræ* resembles *Tornos*; the fore wings are larger and with the apices more produced; the external margin is longer and more oblique. The hind wings are narrow and lanceolate, with the apices pointed and a little depressed; external margin straight or a little incurved. The female abdomen is like that of *Tornos*, and is thickly tufted at the

extremity. This singular genus, which I name for Mr. Meske, may be at once distinguished by the pointed secondaries, narrower in proportion than in any other genus of the group, while the primaries are disproportionately large with straight costa and produced apices.

Meskea dyspteraria Grote (n. s.)

♀. Fore wings of the same cream color as lighter specimens of *Tornos*, shaded outwardly on the interspaces with dusky and dotted with dark scale points. The dusky shades become linear between the median nervules, before a fine white interrupted subterminal line near the external margin. The costal edge shows a few separated dusky dots; there are no traces of the median lines; the cell is shaded with dusky, lined on either side diffusely with whitish towards its inner extremity. Hind wings blackish with a white median band showing a series of dark points; anal angle washed with ochrey; a fine terminal black line relieved by a narrow ochre shade. Above the median band is a deeper black discal shade. Body like fore wings. Beneath the wings are much as above, but darker, with the fore wings more mottled with dusky. Antennæ of the female simple. Expanse $1\frac{2}{3}$ inch.

The type of this species is contained in Mr. Meske's collection in Albany, and was taken by Mr. L. Heiligbrodt, in Bastrop Co., Texas.

CENTER, N. Y., ENTOMOLOGICALLY CONSIDERED.

BY JAMES S. BAILEY, A. M., M. D., ALBANY, N. Y.

Center is situated on the line of the New York Central Railroad, midway between Albany and Schenectady. The road in reaching this point traverses a distance of eight miles from Albany, and attains an elevation of 315 feet above tide-water.

During the warm months there are two daily trains stopping at this station, going east and west, and are so arranged as to give the scientist the advantage of the first half of the day on the ground. The place itself is not in the least attractive, consisting of but a few dwellings erected for the accommodation of the Railroad employes.

It is among the pine barrens and seemingly unfertile and inhospitable soil where is found so much to interest and instruct the student, for here

he can commune undisturbed with nature, and at each step find his pathway strewn with objects of interest. Center has a world-wide reputation botanically and entomologically. The collecting ground is embraced in a tract of one thousand acres, which civilization has never disturbed, but has allowed to remain in its primitive condition. It is now owned by a community of Shakers, living in close proximity.

The entomological tract is situated on the south side of the Railroad, and lies on both sides of the road leading to Sloans, any great divergence from which will not prove successful to the collector. It is unnecessary to traverse this road more than one mile, which brings you near to Mount Brizo, which is a bold projecting sand mound rising abruptly nearly to the height of 100 feet above the surrounding country on the east and gradually sloping to the west.

Upon this point has been found annually a few specimens of *Nisoniades Brizo*. During the last summer the number found was limited to a single pair.

The collecting ground has been subject to accidental visitations of fires, which have proven very destructive to the timber and shrubbery. During the last year a fire broke out and burned over 300 acres of timbered land before it could be subdued. The timber was supposed to be destroyed, but, fortunately, later in the season, the foliage put forth with renewed vigor and beauty. Later in the season another fire occurred, but as to the extent of damage done the writer is unable to determine; but many food-plants, caterpillars, pupæ and imagines must have perished in the flames.

The following Lepidoptera have been taken at Center during the last ten years. It must also be a rich field for the Noctuidæ, but as yet sugaring has not been practiced in the vicinity.

It is proposed to sugar systematically and persistently during the coming season, and if successful, the result will be given at another time.

PAPILIONINA, H. S.

Papilio, L.

Papilio turnus, L.

" *troilus*, L.

" *asterias*, Fab.

PIERIDES, B.

Pieris, Schrank.

Pieris rapae, L.

Colias, Fab.

Colias philodice, Godt.

RHOPALOCERA.

Argynnis, Fabr.*Argynnis* myrina, Cramer.

" bellona, Fabr.

" atlantis, Edw.

" cybele, F.

Nymphalides, B.*Melitaea* tharos, Drury.

" nycteis, Doubleday.

" Batesii, Reakirt.

" Harrisii, Scudder.

" phaeton, Drury.

Limenitis, Fabr.*Limenitis* disippus, Godart.

" ursula, Fabr.

" arthemis, Drury.

SATYRIDÆ, Swainson.

Neonympha, Hüb.*Neonympha* eurydice, Fabr.

" canthus, L.

LYCAENIDÆ, Fabr.

Thecla, Fabr.*Thecla* strigosa, Harris.

" calanus, Hüb.

" irus, Godt.

" augustus, Kirby.

" melinus, Hüb.

" humuli, Harr.

" nippon, Hüb.

Polyommatus, Latr.*Polyommatus* americana, Harris.*Lycaena* neglecta, Edw.

" lucia, Kirby.

" Scudderii, Edw.

" comyntas, Godt.

HESPERIDÆ, Leach.

Ancyloxypha, Feld.*Ancyloxypha* numitor, Fab.*Hesperia*, Latr.*Hesperia* sassacus, Scud.

" leonardus, Harris.

" bimacula, Gr. & R.

" mystic, Edw.

" otho, Sm. & Abb.

" peckius, Kby.

" viator, Edw.

" maculata, Edw.

" massasoit, Scud.

" hianna, Scud.

" verna, Edw.

" metacomet, Harris.

" zabulon, B.

" delaware, Edw.

" vialis, Edw.

Thanaos, Bd.*Thanaos* juvenalis, F.

" martialis, Scud.

" persius, Scud.

" Brizo, B.

" icelus, Lintner.

" lucillius, Lint.

Eudamus, Swainson.*Eudamus* bathyllus, S. & Abb.

" lycidas, S. & Abb.

" tityrus, Fab.

HETEROCERA, B.

Hemaris, Palm.*Hemaris* tenuis, Grote.*Haemorrhagia*, Gr. & R.*Haemorrhagia* gracilis, Gr. & R.

- Haemorrhagia uniformis, Gr. & R.
 " thysbe, Fab.
 " tenuis.
 " Buffaloensis.
 Amphion, Hüb.
 Amphion nessus, Cram.
 SPHINGIDÆ.
 Thyreus Abbotii, Swain.
 Deilephila chamoenerii, Harris.
 " lineata, Fab.
 Darapsa choerilus, Cram.
 " myron, Cram.
 Sphinx drupiferarum, Sm. & Abb.
 " Kalmiae, Sm. & Abb.
 " gordius, Hüb.
 " luscitiosa, Clem.
 Ellema Harrisii, Clem.
 SATURNINA, H. S.
 Euchronia, Packard.
 Euchronia maia, Drury.
 Hyperchiria, Hüb.
 Hyperchiria io, Fab.
 Anisota, Hüb.
 Anisota senatoria, Smith.
 " stigma, Hüb.
 ARCTIIDÆ, Stephens.
 Spilosoma, Stephens.
 Spilosoma isabella, Smith.
 " virginica, Fab.
 " latipennis, Stretch.
 Euchaetes, Harris.
 Euchaetes oregonensis, Stretch.
 " collaris, Fitch.
- THYRIDIDES, H. Sch.
 Thyris, Ochsh.
 Thyris lugubris, B.
 Aegeria.
 Aegeria pictipes, Gr. & R.
 ZYGAENIDES, Latr.
 Ctenucha, Kirby.
 Ctenucha virginica, Carpenter.
 Scepsis, Walker.
 Scepsis fulvicollis, Hüb.
 Lycomorpha, Harris.
 Lycomorpha pholus, Drury.
 Harrissina, Packard.
 Harrissina procris, Harris.
 COCHLEOPODA, B.
 Cyrtosia, Packard.
 Cyrtosia albipuncta, Packard.
 Limacodes, Latr.
 Limacodes scapha, Harris.
 Lagoa, Harris.
 Lagoa crispata, Packard.
 PSYCHIDÆ, B.
 Peraphora, Harris.
 Peraphora Melsheimerii, Hüb.
 PLATYPTERYCIDÆ, Stephens.
 Dryopteris, Grote.
 Dryopteris, rosea, Grote.
 Drepana, Schrank.
 Drepana arcuata, Walk.
 NOTODONTIDÆ, Stephens.
 Hypurpax, Hüb.
 Hypurpax aurora, Sm. & Abb.

The following Lepidoptera are extremely local in their distribution, and are found at Center, but not, I believe, elsewhere in New York.

Lyc. Scudderi.

Hes. metea.

" vialis.

" delaware.

" hianna.

Thecla augustus.

Mel. Harrisii.

Thyris lugubris.

Euch. oregonensis.

Neonympha canthus.

Haem. gracilis.

CORRESPONDENCE.

NOTES ON THE FOOD PLANT OF HEMILEUCA MAIA.

Last season I reared a brood of this rare species from eggs sent me by my worthy friend, Wm. Provis, of Detroit. The locality where he found the eggs is in Oakland County, Mich., known as the 5,000 acre tract, and so low and marshy that it is covered with water part of the year. In his interesting letter, giving a description of the place, he says: "The timber is mostly swamp oak and willow, and the land so low and wet I found great difficulty in getting about." Mr. P. was too late to find any of the larvae, they having finished their growth and entered the ground, but the imagines were very plentiful, flying about in a very lazy manner, and occasionally dropping down in such a way as to induce one to think they had been injured..

Many of the females were depositing their eggs—not, as my friend had expected, on the oak—but on a species of wild aster found in abundance in the locality. The oak and aster are, botanically speaking, widely separated, and yet the female, whose instinct ought to teach her what course to pursue for the welfare of her offspring, is found depositing her eggs on the latter as well as the former, which goes to show that the food plants of this species have a far wider range than had been previously supposed. To convince me he was correct, Mr. Provis sent me a stem of the aster with a cluster of eggs in the form of a ring glued to it.

ROBERT BUNKER.

Camp at "Lake Forest," Erie Co., N. Y., June 8, 1877.

Entomology can be pursued with great success when camping out. Here, on the borders of Lake Erie, our camp is pitched on the top of a

sandy ridge, which is covered with hemlock, beech and chestnut trees, and was formerly, no doubt, a reef when the lake was more extended. An outer sand ridge, parallel with ours, runs along the beach and up the lake, while between the two a small creek finds its way into the larger waters. Last night, at "sugar," about the camp, I took specimens of *Habrosyne scripta*, *Acron. noctivaga*, *Charandra deridens*, *Pyrrhia expimens*, *Zale horrida* and *Homoptera duplicata*. I think *Zale* may be distinguished by its brown, discoloured and exaggerated thoracic tufts. I was much pleased to see many *Sphinxes* come to the bait. I took *Thyreus Abbotii*, *Ellibia versicolor*, *Everyx choerilus* and *Sphinx Kalmiae*. The flight of *versicolor* is more like that of *Kalmiae* than *choerilus*; the latter sits close to the bait, the tongue being apparently shorter than in *versicolor*. The specimen of the latter which I captured (I saw a second) is fresh, and in looking at it one is reminded of the saying of Marcus Aurelius: "That which is beautiful is beautiful in itself; the praise of man adds nothing to its quality." The *Sphinxes* came to the bait till 9:30 o'clock—it being very dark and cloudy; *Kalmiae* was the earliest to appear. The species of *Lithophane* and *Scopelosoma* are now apparently over. *Heliophila Harveyi* and *phragmitidicola* are common at sugar, as well as *Hadena finitima*, and *Eustrotia apicosa* and *carneola*.

A. R. GROTE.

Coalburgh, W. Va., 15th May, 1877.

In my recent Catalogue I named a genus of *Hesperia* on behalf of Mr. Butler, and called it *Lintneria*. It so happens that Mr. Butler had given this name to one of the genera of the Sphingidæ in his late "Revision" of that family, a fact which I only discovered a few weeks ago, and after the Catalogue was published. Mr. Butler proposes the name *Systasea* for the genus of *Hesperidæ* spoken of, which therefore should stand *Systasea* Butl.

W. H. EDWARDS.

EFFECT OF HOT WEATHER UPON THE TRANSFORMATION OF THE SPHINXES.

The 28th of last July I found feeding on the Virginia Creeper two larvae of the Satellite Sphinx (*Philampelus satellitia*). One was nearly full grown, and at the end of three days stopped feeding and entered the ground. August 1st passed through its transformations, and came out the 10th of September. It proved to be a very fine female of large size, with colors unusually bright. The above would seem to show that this species in a warm climate would become double brooded.

ROBERT BUNKER, Rochester, N. Y.

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REMARKS UPON THE CYNIPIDÆ.

BY H. F. BASSETT, WATERBURY, CONN.

In an article published in the ENTOMOLOGIST for May, 1873, I gave the results of my observations upon the genus *Cynips*, so far as they related to the agamous reproduction of certain species.

I showed that at least two two-gendered species, *C. q. operator* O. S. and a species nearly related to, if not identical with, *C. q. batatus* Bassett, were followed in the next generation by a brood composed entirely of females.

I had reared thousands of *C. q. batatus* of both generations, not for one, but for a series of years, and always with the same results. The early summer brood from leaf galls was always made up of both sexes in nearly equal numbers. The brood from the late summer galls came out in the spring (from twig galls), just as the leaves began to appear, and were all females.

In the case of *C. q. operator* there could be really no room for doubt, as this very peculiar species was repeated, except in size, in the females I took in the act of ovipositing.

If there could be any doubt, it was certainly dispelled when Prof. C. V. Riley reared from the acorn cup galls produced by *C. q. operator*, gall flies exactly like those I had found ovipositing in the buds of the shrub oak.

I advanced the idea in that article that when the true history of the one-gendered species should be known, they would be found to alternate with a generation of males and females. Further proof of this than I now offer will hardly be called for.

Dr. Gustav Mayr, of Vienna, in a letter just received, states that Dr. Adler, of Schleswig, has this year published an "epoch-marking" paper upon the subject of agamous reproduction among the Cynipidæ.*

Dr. Adler finds that what have been described as fourteen distinct species of Cynipidæ--belonging to six distinct genera--are really but seven species.

Four species of *Neuroterons* are found to be the agamous forms of as many species of *Spathogaster*.

Two species of *Aphilothrix* are the agamous forms of two species of *Andricus*, and a species of *Dryophanta* is the agamous form of a *Trigonaspis*.

Dr. Mayr himself was at work upon this problem, but had not succeeded, as his efforts to grow oak trees in his garden had failed. He had not given up the attempt, but had ordered more trees to plant this spring.

Neither Dr. Mayr nor Dr. Adler seem to have seen my article. I communicated the substance of it in a letter to Prof. Albert Müller, then in London. This was read before the London Entomological Society at the meeting of April 7th, 1873, but I notice that English Entomologists continue to talk about Hartig's experiments, and agamous reproduction through an infinity of generations, and of a hypothetical male gall fly that must appear now and then, always just in time to save the race from extinction.

Dr. Adler's paper will no doubt receive the attention it justly deserves and it is to be hoped that the success that has followed his experiments may lead others to aid in developing the history of this singular family of insects.

It is not safe to assume that the history of one species will be the history of all, but the idea that these insects are perpetuated through many generations by unimpregnated females must be abandoned.

* Since the above was written I have received a copy of Dr. Adler's paper; also a letter in which he kindly consents to the publication of all or a part of the paper. I propose shortly to prepare for publication in the ENTOMOLOGIST a summary of his remarkable discoveries.

TINEINA.

BY V. T. CHAMBERS, COVINGTON, KY.

GRACILARIA.

G. (Corisceum) albanotella Cham.

The nearest known ally of this species is the European *C. Brongniardellum*, not *C. calicella* St., as I suggested before I knew *Brongniardellum*. *Albanotella* makes a large, somewhat tentiform mine, on the under surface of oak leaves (*Q. obtusiloba* and *Q. alba*); the mine is at first long, winding and *Nepticuli*-form, ending in the large tentiform blotch. The larva, before leaving the mine, becomes pinkish red. In the breeding cage it pupates in a cocoonet which it spins on the surface of the leaves. I have never met with the pupa elsewhere, nor have I ever, although I have seen hundreds of the mines, found one on the upper surface of the leaf. Yet in Colorado I found a precisely similar larva in precisely similar mines, always on the upper surface of the leaves, and the cocoonet of the pupa was always found on the leaves near it. The larva of *albanotella* is abundant in the latter part of May and the first half of June, and I have never seen it at any other time, though from the abundance of the imago in perfect condition in May, I infer there must be a fall brood of the larva. The description should be corrected to state that the ciliae of the fore wings are whitish with the tips at the apex fuscous, and with a wide yellowish hinder marginal line, which sends off two ciliary lines or hooks through the dorso-apical ciliae. The eyes are bright red.

G. fasciella Cham.*Aesyle fasciella* Cham., C. Q. J. S., v. 2, p. 97.

In indicating the new genus *Aesyle* for this species, I committed a mistake very similar to that of Dr. Clemens in establishing his genus *Paractopa* for *P. robiniella*, &c., which also belong in *Gracilaria*. *G. fasciella* finds its nearest ally in the European *omissella*, but the fasciae are oblique and angulated in the latter, and are not in *fasciella*, in which they are perpendicular to the margins; *fasciella* has four white fascia separating the five grayish ochreous ones, the last of which covers the apex, which is

white in *omissella*. The position of *fasciella* in repose is that of a *Gracilaria*, but it has not the slender, graceful appearance of such species as *superbifrontella*, *Packardella*, etc., and the shorter, more robust palpi and antennae and somewhat different neuration indicate affinities with *Lithocolletis*. The second joint of the palpi, though not tufted, is somewhat thickened beneath with scales.

G. (Corisceum) quinquenotella, n. sp.

Very different from *C. quinquestrigella* Cham. ; nearer to *C. albanotella*, but, notwithstanding the small though distinct tuft on the second joint of the palpi, which places it in *Corisceum*, it finds its nearest congener both structurally and in ornamentation in the preceding species, *G. fasciella*.

Pure snowy white ; outer surface of the second joint of the palpi grayish brown ; eyes bright red ; antennae whitish, annulate with fuscous ; thorax with two small brownish specks just before the apex. The marks on the fore wings are grayish fuscous tinged with ochreous, and are placed as follows : there is a basal costal spot extending about one-fifth of the wing length, *sometimes* followed by a small spot about the basal third of the costa ; there is a somewhat oblique streak extending to the fold, and which *sometimes* sends a branch from about the middle of the wing to the costa, thus enclosing a small white costal spot ; then follows a fascia, wide on the costa, where it *sometimes* encloses a small white spot ; at about the end of the cell this fascia curves obliquely back to the anal angle ; it is followed before the apex by another somewhat oblique fascia, and there is still another on the apex ; *sometimes*, however, the apex is yellowish with a small apical brownish spot, followed by a curved hinder marginal line ; the fascia next before the apex is continuous in the dorsal ciliae with a faint dark hinder marginal line, and the fascia at the apex is continuous with another similar line ; or both of these lines may be considered as a single interrupted line. Where I have indicated above that the marking is *sometimes* present, it is sometimes present in one wing and absent in the other of the same specimen. Abdomen fuscous, with the hinder half of each segment on the ventral surface white and anal tuft yellow. Legs and tarsi annulate with brown and white. *Al. ex.* 4 lines. Kentucky, June 10th to 15th.

G. 12-lineella Cham.

This specific name may be misleading, and, indeed, I can not say that

I am certain that there are just twelve white or black marginal markings on the fore wings; these color marks are so narrow, some of them so short and sometimes so faint, that it is well nigh impossible to describe the species with anything like accuracy. The most distinct and salient mark is the oblique dark gray or gray brown streak on each side of each segment of the whitish or pale gray ventral surface of the abdomen. Indeed, owing to the indistinct and confused character of the markings on the fore wings, I have sometimes doubted whether I have not two very closely related species before me. I think, however, there is but one, but any, even the least denudation—such, even, as is almost inevitable in pinning and setting a specimen, even where the denudation is so little that it requires comparison with other specimens to detect it—alters the character of the markings so that a description could scarcely be prepared from one specimen by which another could be recognized. The original description was prepared several years ago from three specimens, and I have never seen another until this year (May, 1877), when I have taken two others.

The wings are very narrow, but the general color and the style of ornamentation are much nearer to those of many species of *Ornix* than to any species of *Gracilaria* known to me. It is, however, a true *Gracilaria*, belonging to the same section (as I think) with our *salicifoliella* and the European *Kallasiella*. In perfectly fresh specimens three or four distinct white dorsal streaks are found before the middle of the wing length, one of which is much larger and more curved than the others, and is placed a little before the middle, and there is another and very similar one about the anal angle. There are some five or six tolerably distinct blackish costal streaks, most of them in the apical half of the wing, and very close to each other; they are the dark margins of as many white streaks, which, however, are, some of them (sometimes all of them save one or two), very indistinct. One of these white costal streaks in the apical part of the wing meets at an acute angle the distinct curved white dorsal streak of the anal angle above mentioned, and just behind it an oblique, narrow, much curved white fascia crosses the wing to the anal angle, where it is continuous with the whitish or pale gray hinder marginal line, which crosses the middle portion of the dark gray ciliæ (or the ciliæ may be described as pale gray, with two wide dark gray hinder marginal lines, one at their base, the other at their tips). But the least denudation removes portions of these white and blackish markings, so that they pre-

sent a very different appearance. Perhaps as good a description as could be given would be to say that it is gray mottled more or less distinctly with white and dark gray marginal streaks on the fore wings, the apex of which is dark gray or gray brown.

G. purpuriella Chamb.

This is the nearest known American representative of the European *G. stigmatella*. It differs from that species as described and figured in Nat. Hist. Tin., v. 8, by having the head and palpi brownish red with a purplish gloss, rather than "reddish gray," and the antennæ purplish brown with very faint white annulations, rather than "pale yellowish with brown annulations." The anterior wings might, perhaps, be called reddish brown, but are very strongly suffused with rich purple; the triangle is white instead of yellowish white, and its margins are not darker than other parts of the wing. As in *stigmatella*, the triangle is sometimes produced beyond the fold. The ciliæ in *stigmatella* are described as "rufous, towards the anal angle gray." In *purpuriella* they do not differ from the general color otherwise than that they have less of the purple hue. The statement in the original description that there is a wide white band across the middle of the posterior femora must have been made under an impression produced by a reflection of the light, or by slight denudation, though the statement that the tip is white is correct, and the base is also white. In *stigmatella* the posterior tibiæ are "pale reddish gray"; in *purpuriella* they are sordid whitish (or white suffused with pale reddish brown); instead of "pale grayish fuscous," as in my original description, the posterior tarsi may perhaps be better described as dark brownish gray, and the other tarsi are of the same hue, whilst in *stigmatella* all the tarsi are described as "whitish faintly spotted with pale gray." My specimens range from a little over six to full seven lines *al. ex.*; *stigmatella* is seven lines. It makes the most perfect "cone" of all the species known to me, frequently using up the entire leaf. I have never found it on any willow except *S. longifolia*. The small spots in the triangle vary in number and size. The most striking difference on comparing a specimen of *purpuriella* with the figure of *stigmatella*, is in the ciliæ of the fore wings, which in *stigmatella* are much paler, more yellowish, while in *purpuriella* they are so dark as to make it somewhat difficult to detect the three hinder marginal lines.

G. erigeronella.

G. plantaginisella Cham.

In one of the vols. of the Zoo. Rec. the Recorder has expressed some surprise at my having changed the name of a species first described by me because I had discovered its food plant. Nevertheless, the practice is so general, and, in my opinion, it is in every way so convenient and proper, to give to the *Tineina* specific names derived from the food plants of the larvæ, that I can not but think it best to adhere to it rather than to an arbitrary rule of priority, especially where the name first given has probably never been used except by the person who bestowed it, and where the change is made by that person, and the first name is not only inappropriate, but misleading, as it would be in this instance. It is not necessary to explain how I was led into the error of supposing that this species feeds on *Plantago* instead of *Erigeron*.

There is a *Gracilaria* larva which, when very young, makes a small mine in the upper surface of the leaves of the Hop hornbeam (*Ostrya Virginica*), but I have never been able to have its subsequent history. Like some other larvæ of this genus, when very young, it shows some resemblance to the flat group of larvae of the genus *Lithocolletis*.

NOTES ON LARVÆ—FONDNESS FOR WATER—HINTS TO BEGINNERS.

BY C. G. SIEWERS, NEWPORT, KY.

Last spring, while collecting beetles under the bark of decayed logs, I met with numbers of the larvæ of *Arctia isabella* (hairs brown in the middle, black at each end of larva,) about to spin up. Not knowing their hibernating habits, they had always baffled me, and under the impression that they would require another season to mature, had been turned loose. I collected some twenty, put them into a box with cotton and paper scrap, and they at once spun up, all but four. These wandered up and down for a week, having some want, and wasting away. It

struck me they might want water. Wetting a sable, I proffered a drink. They all drank greedily, grasping the brush with their fore-legs, and even following it around. I watered them two or three days, but tired of this and threw them out. The same day they were found spinning up on the fence. This spring I collected another lot, and gave them some curved bark to spin in. About one half refused to spin. I soused them with water. Two remained contumacious, but another wetting brought them to terms. The black larva of the Great Leopard Moth, *Ecpantheria*, hibernates also, spins up about the first of June, and emerges about the 15th with us. Feeds on Poke-berry plant, and will eat cabbage. I failed to winter some twenty this season. Either they dry up in the house, or mould in the cellar. They should be wintered out-doors, in a box without bottom placed on the ground and half filled with leaves and brush, exposed to the weather, but having proper drainage. They come out of the leaves in the spring distended by moisture. Whether they feed before spinning is uncertain. I collect them in the fall at the foot of willow trees, when digging up the pupa of *Smyrinthus geminatus*.

It is generally claimed that moist leaves will induce scouring in the *Bombix mori*, but out-door larvæ get abundance of rain and dew, and may require it. In confinement they fail to get their full growth. Their food should be sprinkled daily. The great difficulty of keeping the food fresh deters many from rearing larvæ. To such I would say, try tin boxes or glass jars. Clean daily and keep moist. Two or three drops of water are sufficient. I have had a lot of empty fruit cans capped, and have kept food fresh in them for ten days. When the nearest food plant is three miles distant this is some object. I find that they do not require light, and but little air. When they cease feeding, remove to spinning or ground boxes. The ground must be kept moist, or the larva will be unable to remove the skin around the thorax, and strangle. If they find it too dry they will come out and try to escape. Many wander about for a day or two before burying themselves. Covering the ground with sod often expedites matters. When ten days have passed they may be sifted out to give place for others, and laid out in another ground box on top, as it is preferable to have them in sight, on account of vermin. Never pull larvae from their food, especially when moulting in changing food. Clip the old food off around them, and they will change themselves. Placing some hungry *Apatura clytons* three inches from fresh food, they struck a bee line for it.

Raising larvæ is by far the most instructive feature of Entomology, and very interesting. Entirely too little attention is paid to it. We want the whole life. How utterly ignorant we are, for instance, about the larvæ of *Catocala*? Let all faulty females be confined, and they may lay impregnated eggs; try the young on willow, walnut or oak leaves. The female is known by the heavy body tapering to a point; the male terminates in a pair of claspers. Some species are readily determined by their antennæ, the males being more broadly pectinated than the females.

The larvæ of wood-boring beetles can be raised in tin or glass on wet saw-dust (not pine); any mixed hardwood or poplar will do. I have kept them so six and eight months, changing the saw-dust once a month. But they are very tiresome, as one may have to keep them a year or two.

ON A NEW SPECIES OF COSSUS.

BY J. A. LINTNER, N. Y. STATE MUSEUM NAT. HIST., ALBANY.

Five years ago, I discovered at Center, in the trunks of poplar trees (*Populus tremuloides*) several pupal cases of a *Cossus*, which, by their differing from the other cases known to me, of *C. Robinie* and *C. querciperda*, I had reason to believe was an undescribed species. This year, on the 14th of June, on examining some infested trees, several pupal cases were discovered projecting half-way from the trunks, and an imago, which had apparently just emerged, and was resting on the stump of a broken limb. The colors of the moth so exactly simulated the surface on which it rested that it was with difficulty observed, even when looking directly at it. The moth, in all probability, is an undescribed species, for, from the description given by Walker of a *Cossus* found at Hudson's Bay, and named by him *C. populi*, it must differ from that species.

In recognition of the very large number of rare Lepidoptera which the Center locality has yielded and still continues to give to persistent exploration, I propose for it the name of *Cossus Centerensis*.

The female, in its appearance, approaches nearer *C. querciperda* than any other of our species. The collar and thorax are black, edged with grey scales. The abdomen is black above, interspersed with grey scales toward its tip, and more thickly beneath. The primaries are black over rather more than their inner half, with some grey scales a little within the centre of the wing; the centre portion of the wing beyond the reniform is greyish. The wing is traversed by broken, black, transverse lines, of which twenty or more can be counted on the costal margin; three or four of those on the outer portion are more continuous and conspicuous than the others. The fringe is marked with black scales opposite the veins. The secondaries are nearly transparent, darker along their inner margin, showing some faint reticulations, which are more conspicuous beneath.

The male strongly resembles the female, instead of presenting the marked contrasting differences found in *C. robinæ* and *C. querciperda*. Its wings are only a little more projected apically than in the other sex.

Expanse of wings of the pair in my collection, ♂ 2 inches; ♀ 2.5 inches. Length of body, ♀ .95 inch.; ♂ 1.20 inch.

Subsequently to the capture of the above, several additional examples have been taken in the same locality. On the 18th June four specimens were collected by Mr. Meske.

NOTICE OF MR. BUTLER'S REVISION OF THE SPHINGIDÆ.

BY A. R. GROTE,

Director of the Museum, Buffalo Society Natural Sciences.

The object of this notice is to call the attention of American Entomologists to a most excellent and complete "Revision of the Family Sphingidæ," by Arthur G. Butler, of the British Museum, which has appeared in the Transactions of the Zoological Society, London, in quarto form. A proper arrangement of the Sphingidæ of the world is a work requiring both extensive material and great experience and tact, of which

Mr. Butler has shown himself to be equally possessed. It is not my intention at this time to discuss minor points (such as Mr. Butler's citation of *Philampelus satellitia* Harris to Linne's species of that name instead of to *pandorus*, where it belongs), or the larger questions as to the number of groups, Mr. Butler separating the *Ambulicinae* from the *Cherocampinae*, while Grote and Robinson in 1865 left them united. The arrangement, indeed, is virtually that of our synonymical catalogue of 1865; the genus *Acherontia*, not represented in America and left out of consideration by ourselves, is made into a separate sub-family *Acherontiinae* by Mr. Butler. I wish merely to note here the changes which I am at present willing to admit in the arrangement proposed in the "Check List of North American Sphinges" published by myself in 1875.

Haemorrhagia G. & R.

I do not admit that *Buffaloensis* and *uniformis* are identical. The former is smaller sized and there is a slight toothing or unevenness of the inner margin of the terminal band of the primaries. The discal cell is reduced and the transverse scale line tends to be absorbed by the scales clothing the median vein. Nor do I admit that Kirby's *ruficaudis* is the same as *uniformis*; I have shown that Kirby's description boldly contradicts it. There is some warrant for believing that Kirby intended *diffinis* or a species of *Hemaris*, as I have shown, CAN. ENT., 6, 170. Mr. Butler's *ruficaudis* is probably *uniformis*. The Albany collectors take both *Buffaloensis* and *uniformis* (Mr. Lintner has reared *Buffaloensis*), and we may look for further careful and consequently decisive information from them in regard to these points. Although Mr. Butler speaks adversely, and perhaps a little vexatiously, on p. 518, as to the validity of the genus, on p. 521 he says of *Haemorrhagia*: "This may, perhaps, be a genus, the species being more densely scaled than in *Hemaris*, and having consequently a somewhat different aspect; on the whole, however, I prefer to regard it for the present as a section." The reason, if I remember rightly, that we were not certain of the generic position of *radians* was that we did not know the species, nor have I seen it since 1865.

Callenyo Grote.

This term should be employed, I think, for *carinata* as distinguished by Mr. Butler from *Aleuron* (*chloroptera*, etc.).

the sum maintaining
 variety and self
 love.

Everyx Boisd.

Having in 1865 restricted Walker's term *Darapsa* to *rhodocera*, I should not again have used it for this genus. I abandoned my restitution of Hübner's term *Otus* for this genus because the term is preoccupied in ornithology. Boisduval's term must stand for the species, which are apparently four, in number, *syriacus* from Asia, and *cherilus*, *myron* and *pholus* (W. J.) from America.

Elibia Walk.

To this genus Mr. Butler refers *Chaerocampa versicolor* of Harris.

Smerinthina.

The genera proposed by myself are for the most part adopted. I am not now prepared to accept the extension of *Calasymbolus*. The following change seems to be proper :

Triptogon Brem.

To this genus should be referred the *Smerinthus modesta* of Harris.

[Since writing the above, Mr. Butler has kindly replied to my note to him conveying the substance of the foregoing remarks as to *C. astylus*. I feel authorized to take *S. geminatus* as a new generic or sub-generic type under the name *Eusmerinthus*, differing from *ocellatus* of Europe and *ophthalmicus* of California in the shorter subcostal nervules of fore wings, the angulated external margin, while the median vein runs close to the subcostal for one-third its length ; while the median branches are shorter, the wing may be seen to be markedly distinct in form. In the hind wings the apices are more rounded and the outline differs by the indentation before anal angle. The antennae are comparatively shorter. I am indebted to Mr. Butler for sketches and notes defining this group, in which I would include *cerisii*, *coecus* and *Kindermannii*.]

Sphinginae.*Isognathus* Feld.

Mr. Butler omits to note that I adopted this genus for *rimosa* and *congratulans*, Tr. Am. Ent. Soc., 185. I am not now in possession of any of my material of the species of *Dilophonota*. I think that Mr. Butler has been rash in his conclusions, in view of the fact that he had no material from Cuba before him. Boisduval adopts my identification of

oenotrus, and, on the whole, I am decidedly of opinion that Mr. Butler has again brought confusion into the difficult group by his synonymy, which is at variance with that given by Dr. Boisduval and myself.

Protoparce Burm.

As having priority over *Macrosila* Walk., Mr. Butler refers our species to this genus of Burmeister's. Boisduval claims the term *Macrosila* for *tetrio*, but for this species *Pseudosphinx* has priority.

LIST OF CANADIAN DIPTERA.

BY WM. COUPER, MONTREAL, P. Q.

The following list of Canadian Diptera has been compiled from British Museum catalogues for 1848 and '49. The greater number of the species were described by the late Francis Walker. Those from Hudson's Bay were collected by Geo. Barnston, Esq., of Montreal, when residing at St. Martin's Falls, Albany River. The material from Nova Scotia was presented by Lieut. Redman to the British Museum. I have not included the species collected by Mr. Doubleday in the United States, nor those recorded as coming from North America. A few species from Newfoundland and New York Factory are also omitted.

FAM. I. TIPULARIÆ.	Chironomus nigritibia, Hudson's B.
Sec. I. Culiciformes.	" albistria "
Culex stimulans, Nova Scotia.	" crassicolis "
" impatiens, Hudson's Bay.	" unicolor, Nova Scotia.
" punctor "	" lasiomerus, Hudson's B.
" impiger "	" festivus "
" implacabilis "	" lasiopus "
" provocans, Nova Scotia.	" attenuatus "
Chironomus bimacula, Hudson's B.	" flavicingula "
" confinis "	" fimbriatus "
	" trictiomerus "

Chironomus brunneus, Hudson's B.	Mycetophila parva, Hudson's Bay.
" pellucidas "	" plebeja "
Tanypus decedens "	" obscura "
Ceratopogon transiens "	" despecta "
" parvus "	Sciara exigua "
" obscurus "	" robusta "
Asthenia americana "	" atrata "
Lasioptera parva "	" perpusilla "
Cecidomyia spongivora "	" polita "
Psychoda degenera "	" abbreviata "
Pedicia albivitta, Nova Scotia.	Simulium decorum "
" contermina "	" invenustum "
Limnobia simulans, Hudson's Bay.	Scatopse nitens "
" badia, Nova Scotia.	" obscura "
" cana, Hudson's Bay.	" pusilla "
Tipula triplex, Nova Scotia.	Arthria analis "
" duplex "	Penthetria atra "
" borealis "	Dilophus serraticollis "
" maculipennis "	" fulvicoxa "
" frigida "	Bibio humeralis, Nova Scotia.
" dorsimacula "	" scita "
" alterna "	" vestita "
Ptychoptera metallica, Hudson's B.	" fumipennis, Hudson's Bay.
Hesperinus brevisfrons "	" striatipes "
Bittacomorpha clavipes, N. S.	" gracilis, Nova Scotia.
Anisomera longicornes, Hudson's B.	
Chionea aspera "	FAM. II. XYLOPHAGI.
Trichocera bimacula, Nova Scotia.	Beris quadridentata, Hudson's Bay.
Asindulum tennipes, Hudson's Bay.	Xylophagus fasciata "
Diomonus nebulosus "	
Sciophila rufilatera "	FAM. III. TABANII.
Leja unicolor "	Tabanus calens, Nova Scotia.
" varia "	" Tarandi, Hudson's Bay.
" trifasciata "	" flavipes, Nova Scotia.
Mycetophila bifasciata "	" affinis, Hudson's Bay.
" propinqua, Nova Scotia	" zonalis "
" contigua "	" melanocerus "
" lata "	

<i>Tabanus vicinus</i> , Hudson's Bay.	<i>Thereua conspicua</i> , Nova Scotia.
" <i>inscitus</i> "	" <i>senex</i> "
" <i>frontalis</i> , Nova Scotia.	
" <i>intermedius</i> , Hudson's B.	SUB-ORDER—PROBOSCIDEÆ.
" <i>imitans</i> "	
" <i>gracilis</i> , Nova Scotia.	FAM. VII. BOMBYLIARII.
" <i>marginalis</i> "	
" <i>simulans</i> "	<i>Anthrax oedipus</i> , Nova Scotia.
<i>Chrysops vittatus</i> "	" <i>fascipennis</i> "
" <i>furcatus</i> , Hudson's Bay.	" <i> analis</i> "
" <i>moereus</i> , Nova Scotia.	" <i>vestita</i> "
" <i>sepulchralis</i> , Hudson's B.	" <i>fulviana</i> "
" <i>carbonarius</i> , Nova Scotia.	" <i>bastardi</i> "
	" <i>lateralis</i> "
FAM. IV. LEPTIDES.	<i>Bombylius pygmaeus</i> , Hudson's B.
	" <i>major</i> "
<i>Rhagio intermedius</i> , Hudson's Bay.	<i>Dasypogan sexfasciata</i> , Nova Scotia.
" <i>mystacea</i> , Nova Scotia.	" <i>argenteus</i> "
<i>Leptis proxima</i> "	" <i>falto</i> "
" <i>reflexa</i> "	" <i>lutatus</i> "
" <i>quadrata</i> "	<i>Laphria æatus</i> , Hudson's Bay.
" <i>fumipennis</i> "	" <i>posticata</i> , Nova Scotia.
<i>Atherix variegata</i> , Hudson's Bay.	" <i>thoracica</i> "
	" <i>sericea</i> "
FAM. V. XYLATOMÆ.	" <i>sacrorator</i> "
	<i>Asilus lecythus</i> "
<i>Thereua vicina</i> , Nova Scotia.	" <i>apicalis</i> "

A NEW PLUSIA ALLIED TO HOCHENWARTHII.

BY A. R. GROTE,

Director of the Museum, Buffalo Society Natural Sciences.

M. C. R. v. Osten Sacken has been kind enough to send me a few Noctuidæ collected by himself in Colorado and the West. Among them

is a new *Plusia*, allied to *alticola* and the yellow-winged European species, which I dedicate to its discoverer under the name of *Plusia Sackenii*. It is larger than its allies, and to be at once distinguished by the transverse posterior line being inwardly bent opposite the cell. Fore wings dark gray, with the median space below the median vein rich brown, reminding us of *ampla*. Interior line golden, arcuate, interrupted on cell, inaugurated on costa by an interior golden patch. Cell shaded with light pinkish gray. Reniform moderate, upright, apparently open to costa, with fine golden annulet, preceded by a dusky costal shade. Metallic mark smaller than in allied forms, and open or v-shaped outwardly. Beyond it an elongate pale golden spot separate. These metallic marks are set in a richer brown. Transverse posterior line geminate, concave, slightly trembled superiorly, below median vein (or rather vein 3) with a fine golden interior line and edged by reddish brown on median space, while there is a spot of same color outside the line at its rounded termination near internal angle. Subterminal line indicated by difference in shade color, dentate. Hind wings light yellow above and below, with a moderate black marginal band. Costa beneath somewhat brownish, and a small discal dot is apparent; above the base is dusky and there is a faint and narrow lunule.

This species was taken at Idaho Springs, Colorado, on Aug. 15th; the specimen bears the number "2." It differs strongly by the ornamentation of the primaries from any known species of the yellow-winged group. The internal margin of primaries is more sinuate and the habitus is rather that of *ampla* and allied forms with dusky secondaries. The new species expands 34 mil.

I avail myself of this opportunity to correct two errors in certain of my previous communications. On page 89 of this volume I should have given Prof. Lintner and not Mr. Hill the credit for the observation on *edusa* and *lunata*. We owe very much to the patient investigations of Prof. Lintner with regard to our moths, and I need no excuse to praise his carefulness nor the superb condition of the Albany collections under his charge.

On page 106 a correction must be made: for *vautalis*, read *rantalis*.

BOOK NOTICES.

Economic Entomology, by Andrew Murray, F. L. S., London, England. Aptera, 8vo., pp. 433, profusely illustrated with wood-cuts.

This useful volume is the first of a series of hand-books which are intended to serve as guides to the different departments of the collection of Economic Entomology in process of formation at the Bethnal Green branch of the South Kensington Museum, and also as practical treatises for the use of the public generally. In order the better to serve its primary purpose of guide to the collection, the contents of the several cases are described in this volume in the order in which they present themselves to the visitor, containing in some instances other specimens than insects. The work opens with a short chapter on Crustaceans likely to be mistaken for insects; for example, species of *Oniscus*, *Porcellio* and *Armadillo*. Next in order are the Myriapods—Julidæ and Scolopendridæ; then Scorpions and their allies; Spiders, Mites, Lice, Thysanura (Spring-tails) and Lepismidæ. Three new genera and thirteen new species are described in this volume.

The descriptions are briefly and plainly written, and the habits and life history of the species are delineated in a pleasing and popular manner. The work is well printed in good, clear type, and most of the illustrations are excellent. Already we have found it very useful, giving in a condensed form a vast amount of information not otherwise readily obtainable. We heartily commend this work to our readers, and trust that the talented author may be spared to complete the series proposed, which will appear in the following order: 2nd vol., Bugs; 3rd, Locusts, Grasshoppers, Cockroaches and Earwigs; 4th, Two-winged Flies; 5th, Bees, Wasps, &c.; 6th, the Dragon Flies and May Flies; 7th, Butterflies and Moths, and lastly, the Beetles.

Ninth Annual Report of the Noxious, Beneficial and other Insects of the State of Missouri. By Chas. V. Riley, State Entomologist, March, 877; 8vo., pp. 129, with 33 illustrations.

We welcome the ninth of this series of valuable reports with much leasure. The following are the subjects treated of in the order in which they appear: The Gooseberry Span Worm; the Imported Currant Worm; the Native Currant Worm; the Strawberry Worm; Abbott's White Pine

Worm ; LeConte's Pine Worm ; the Colorado Potato Beetle ; the Army Worm ; the Wheat-head Army Worm ; the Rocky Mountain Locust ; the Hellgrammite Fly, and the Yucca Borer. The bulk of the report, sixty-seven pages in all, is occupied with details in reference to that terrible scourge of the West, the Rocky Mountain Locust, *Caloptenus spretus*, the other and less important subjects being much more briefly treated of. These reports contain an immense fund of valuable information, and have done much to popularize Entomology in America.

Harpalus caliginosus from Nature, by Franklin C. Hill ; two plates. We are indebted to Mr. Franklin C. Hill, of Princeton College, N. J., for copies of these excellent plates, recently published. They are beautifully finished and conveniently mounted on cards, 5 x 8, with all the organs and divisions both of the under and upper surface, distinctly named. They will prove a valuable help to beginners, and indeed to all who are not already familiar with the names of the different portions of the body of Coleopterous insects.

CORRESPONDENCE.

AN INSTANCE OF RETARDED DEVELOPMENT.

On the 24th of September, 1875, I took a great many large caterpillars of a reddish buff color, with a dark dorsal stripe, feeding on willow. They soon went down to the soil and spun themselves up in hard brown cocoons, when I put them away for the winter. In the spring of 1876 I brought them to the heat, and after waiting some time and nothing appearing, I opened one of them and found the caterpillar alive and as fresh in color as when it first spun up. In this condition they continued until the fall, when I again put them away for the winter. In the spring of 1877 I again examined them, and found them fresh and with signs of life, but as the season advanced I opened some and found them dead, and the remainder having assumed a shrivelled look, I laid them aside as hopeless. On the 17th of June my attention was attracted by a scratching noise, which I found came from these cocoons, which were now reduced

in number to six. On lifting, I found one of them rattling and shaking with great vigor; I returned it to the box and waited three days, when nothing appearing, I broke it open and a fully developed fly walked out in a very feeble condition. Its length was 1 inch, expanse $1\frac{3}{4}$ inches. Head, thorax and legs black, antennæ and feet yellow; abdomen brown; a yellow spot between thorax and abdomen; wings light smoky brown.

J. A. MOFFAT.

Hamilton, June 26th, 1877.

MELITAEA PHAETON.

I have caught this summer over fifty specimens of *Melitaea phaeton*; they have been extremely common here. I saw a gentleman recently from Ottawa who told me that he could have caught them by the hundred in that neighborhood, they were so very abundant.

GEO. W. PEARSON, JR., Montreal.

HOW TO DESTROY CABINET PESTS.

There is nothing more annoying to the experienced, or more discouraging to the young collector, than to have his specimens destroyed by mites, by the *Anthrenus*, or by the larva of *Dermestes*. Against the ravages of these enemies there is no security. Paste and paper fail to exclude them; camphor is only a partial protector, and the only safeguard of our cabinets is constant vigilance, and the instant destruction of the offenders when observed.

For this purpose many methods have been suggested—saturation with turpentine, immersion in alcohol or benzine, exposure to a heat of 210 degrees in a drying closet or oven, &c.; but most of these ways are apt to injure, or even destroy the specimens, while the last is often ineffective. Having, however, found a certain and rapid method of dealing with these intruders, I desire, through your pages, to make it known to my brother naturalists.

Some two years ago, I had a magnificent female *Platysamia* (*Saturnia*) *cecropia*, measuring $6\frac{7}{8}$ inches across the wings when set out, which came out of a chrysalis in my breeding box. I succeeded in killing and stretching it without damage, and when dry, transferred it to my interim box, which hung against the wall. In about a fortnight I was annoyed to

see its antennæ cut off, the head and thorax denuded of most of their down, and some large holes made in the abdomen. After some consideration, I placed a gallipot, containing about 25 grains of cyanide of potassa roughly bruised, with a very little water, in the bottom of the case. I then introduced six drops of sulphuric acid, and let down the glass. In less than a minute I had the satisfaction of seeing a fine, stout *Dermestes* larva writhing in the death agony on the bottom of the box. Since that time I have tried the same several times, and always with the same success. It is equally applicable to the extermination of moths, &c., in stuffed birds and quadrupeds, as no animate being can inhale this gas and live.

JAMES T. BELL, Belleville, Ont.

[NOTE.—Great caution would be necessary in using this remedy, not to inhale any of the highly poisonous gas which by the use of the ingredients named would be rapidly generated.—ED. C. E.]

In October, 1875, I found *Meloe angusticollis* Say in large numbers in our potato fields, but could not find any feeding on the vines. About 25 or more found their way into our gardens, and almost completely devoured a few plants of *Anemone japonica* (*Ranunculaceæ*). We have a large collection of annual and perennial plants, but the *Meloes* could find nothing to suit their tastes but these *Anemones*. We had no *Ranunculus acris* on our grounds.

Yours respectfully,

CHAS. D. ZIMMERMAN, Buffalo, N. Y.

LIMENITIS PROSERPINA.

Limenitis proserpina has been taken in this locality now and again, but rarely more than one in a season, and always in connection with *arthemis*.

J. A. MOFFAT, Hamilton, Ont.

CAPTURES AT SUGAR.

I have taken at sugar at Morristown, N. J., *Ellibia versicolor*, *Everyx choerilus* and *E. myron*.

GEO. W. PECK, New York.

AGROTIS FENNICA WANTED.

I very much want four or six good specimens of *Agrotis fennica*. I believe the insect, though certainly not common, is by no means a rarity in some localities in Canada, but I am at a loss to whom to address myself.

W. T. DOBREE, Hull, England.

The Canadian Entomologist.

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LONDON, ONT., AUGUST, 1877.

No. 8

ON THE PREPARATORY STAGES OF SATYRUS NEPHELE.

BY W. H. EDWARDS, COALBURGH, W. VA.

I have tried for several years past to raise larvæ of *Satyrus nephele* to maturity, but met with no success till this last spring. It is very easy to obtain the eggs by confining the female with a tuft of grass. I tied a gauze bag on such a tuft set in a flower pot, while in the Catskills, and 21st August, 1876, obtained perhaps fifty eggs. Some were laid on the blades and stems of the grass, but many were dropped loose on the ground. The eggs hatched about the 21st of September, and the young larvæ without feeding entered upon their hybernation. I brought them to Coalburgh and transferred them to grass set in a pot. They were not so sound asleep but that they were able to attach themselves to the stems. The plant was placed in as cool a room as I could give it, and allowed to die, the larvæ remaining on the dried stems. On 29th Jan'y I found that about one-third of the larvæ were still alive, and I placed them on fresh grass in the greenhouse. These were feeding 1st February, as I could see by the bits cut from the edges of the leaves. The color of the newly hatched larvæ was carnation, marked by horizontal carmine lines, but very soon after beginning to feed they turned to pale green, and the stripes changed from red to a green darker than the ground. The appearance of the larva at this first stage is very singular, owing to the long curved bristles which arm the back and sides, giving a general resemblance to a fish bone. The 1st moult was passed 26th Feb'y and next following days. The 2nd on 21st March; the 3rd, 3rd April; the 4th, 18th April; the first chrysalis formed 16th May, and the butterfly emerged 30th May. The stages were unusually long, but I find that characteristic of all species of *Satyridae* that I have bred. And the larvæ are sluggish, moving very little and

slowly. In their general appearance after the first stage—in shape of body and head, and the form of the second segment—and in their habits, the larvae of some of the species resemble the larvae of *Hesperidea* closely, and there is a marked likeness between some of the *Satyrid* and *Hesperid* chrysalids. The coloration in all the stages after hibernation in *nephele* is that of the grass the larva feeds on, or very nearly, and the larvae, although so slow in their motions, fall from the stems at the least alarm ; so that they are sufficiently protected in their natural state against most enemies. The resemblance between the larvae of *nephele* and *sosybius* is very close indeed. So between the chrysalids, while *gemma*, usually grouped with *sosybius*, has quite a different caterpillar and chrysalis. *Eurytris* is much like *nephele*, except in color. I will soon give full descriptions of all these species in their early stages.

EGG OF NEPHELE—Conoidal, somewhat flattened at base, truncated at top, the sides rounded ; about 18 vertical ridges, with rounded excavations between, spring from the lower part of the side and run to the edge of the top ; this last is rounded, and covered with shallow cells, irregularly hexagonal around the outside, and in the middle long and narrow about an oval central cell. Duration of this stage 28 days.

YOUNG LARVA—Length one-tenth inch ; the anterior segments thickest ; on each side are three rows of long white bristles, one row being at the edge of dorsum, one on middle of the side, and one over the feet ; these spring from very prominent papillae, and the effect is to make the larva seem many sided ; the dorsal rows have one bristle on each of segments 2, 3, 4, but two on each of the others to last, and these are all curved back ; the second row has one to each segment and all are curved forward except on two last segments ; the lower row has two to each, and all are curved back ; color of body carnation ; there is a medio-dorsal crimson line, and three such lines close together on the side ; head large, one-half broader than 2, broader than high, sub-globose ; color light yellow-brown, specked with brown, and sparsely pilose ; on some examples there are cloudy brown patches over the upper part of the face. Larvae hibernate at this stage.

AFTER FIRST MOULT—Length $\frac{1}{16}$ inch. ; cylindrical, thickest anteriorly ; the last segment terminating in two round, tapering and sharp appendages or tails, which are green, red at tips ; these are not divergent from a common base, but each starts from the extreme side, and the interval between their bases is square ; color pale green, crossed longi-

tudinally by dark green stripes, one rather broad, medio-dorsal, and three close together on side ; each segment creased several times, and on the ridges thus caused are white papillae, each sending out a blunt white hair ; head nearly as before, a little broader than 2, somewhat broader in proportion to the height, light green, with white papillae in vertical rows, each with white hair. Duration of this stage 23 days.

AFTER SECOND MOULT—Length $1\frac{1}{16}$ inch. ; very much as before ; whole surface one shade of yellow-green, except a dark dorsal stripe and a yellow ridge over the feet ; head nearly as before. Duration of this stage 14 days.

AFTER THIRD MOULT—Length $1\frac{1}{8}$ inch. Nearly as at last stage ; the head sub-globose, higher and narrower than before, well rounded at top, and broadest below ; color of head emerald green, and covered as before with conical papillae. Duration of this stage 14 days.

AFTER FOURTH MOULT—Length $1\frac{5}{16}$ inch. ; greatest breadth $1\frac{1}{8}$ inch. This stage continued 28 days before chrysalis.

MATURE LARVA—Length 1.20 inch. ; greatest breadth $1\frac{1}{8}$ inch. Cylindrical, thickest in middle segments, the back well rounded, and sloping equally to either extremity ; ending in two sharp, conical tails, each placed at the extreme sides of the last segment ; color dull yellow-green, the sides a shade darker than dorsum ; a medio-dorsal dark green vascular stripe, and over the feet a yellow stripe or line ; tails reddish ; each segment creased about six times, and on the ridges so caused are many fine white papillae, each sending out a fine white hair, rendering the whole surface pubescent ; head sub-globose, a little larger than 2, frontally somewhat flattened, rounded at top, broader across the ocelli ; color emerald green, the surface covered with slightly paler conical papillae, pubescent.

CHRYSLIS—Length $\frac{1}{8}$ inch. ; greatest breadth $\frac{1}{8}$ inch. ; cylindrical, the abdomen evenly tapering ; the wing cases a little raised at the margins ; headcase short, roundly excavated at sides, and rounded at top ; mesonotum slightly prominent, and followed by a small depression ; roundly carinated, the sides nearly flat, or very little rounded ; whole surface one shade of yellow green, covered with minute white granulations ; along the inner margins of wing cases a cream white line, another along keel of mesonotum, and one across top of head case. Duration of this stage 14 days.

LIST OF ACRIDIDÆ FOUND IN NEBRASKA.

BY LAWRENCE BRUNER, WEST POINT, NEBRASKA.

- Opomala carinata*, Thos.
 " *aptera*, Scudd.
 " *brachyptera*, Scudd.
 " *bivittata*, Serv.
 " *neo-mexicana*, Thos.
 " *punctipennis*, Serv.
 " (?) *varipes*, Serv. : at Omaha
 two years ago.
Chrysochraon viridis, Thos.
 " *punctulatum*, Thos.
 " *conspersum*, Thos.
Stenobothrus admirabilis, Uhler.
 " *brunneus*, Thos.
 " *aequalis*, Scudd.
 " *propinquans*, Scudd.
 " *curtipennis*, Scudd.
 " *gracilis*, Scudd.
 " *maculipennis*, Scudd.
Gomphocerus clavatus, Thos.
 " *simplex*, Scudd.
 " *euterpe*, G. M. Dodge.
Stetheophyma gracilis, Thos.
Tragocephala viridifasciata, Harris.
 " *infusca*, Harris.
Tomonotus sulphurea, Sauss.
 " *xanthopterus*, Thos.
 " *carinatus*, Thos.
 " *tenebrosa*, Thos.
Ædipoda carolina, Serv.
 " *nebrascensis*, Bruner.
 " *discoidea*, Serv.
 " *eucerata*, Uhler.
 " *phoenicoptera*, Germ.
- Ædipoda* (?) *venusta*, Stahl.
 " *sordida*, Burm.
 " *neglecta*, Thos.
 " *corallipes*, Haldiman.
 " *aequalis*, Uhler.
 " *collaris*, Scudd.
 " *trifasciata*, Walker.
 " *cincta*, Thos.
 " *verruculata*, Scudd.
 " *kiowa*, Thos.
 " *picta*, Scudd.
Brachypeplus magnus, Girard.
Stauronotus elliotti, Thos.
Boopedon nubilum, Thos.
 " *flavofasciatum*, Thos.
Pezotettix picta, Thos.
 " *nebrascensis*, Thos.
 " *unicolor*, Thos.
 " *Scudderi*, Uhler.
 " *borealis*, Scudder.
 " *alba*, G. M. Dodge, n. sp.
 " *junius* " "
 " *autumnalis* " "
 " *speciosa*, Scudd.
 " *gracilis*, Bruner, n. sp.
 " *occidentalis*, " "
Ommatolampis viridis, Thos.
Caloptenus bivittata, Uhler.
 " *differentialis*, Thos.
 " *fasciatus*, Scudd.
 " *spretus*, Uhler.
 " *femur-rubrum*, Burm.
 " *griseus*, Thos.

Caloptenus (?) bilituratus, Walk.	Acridium alutaceum, Harr.
" lurida, G. M. Dodge.	" emarginatum.
" minor, Scudd.	Tropidacris dux, Scudd.
" punctulatus, Uhler.	Tettix ornata, Scudd.
" occidentalis, Thos.	" granulata, Scudd.
" regalis, Dodge, n. sp.	" cucullata, Scudd.
" volucris, (?).	" triangularis, Scudd.
" angustipennis, (?).	Tettigidea lateralis, Scudd.
Acridium americanum, Scudd.	" polymorpha, Scudd.
" ambiguum, Thos.	Batrachidea cristata, Scudd.

And in addition I have

3 species of *Pezotettix*, not yet determined.

2 " *Caloptenus* " "

2 " *Oedipoda* " "

And 3 others of different genera not yet determined, making a total of 95 species for Nebraska thus far.

TINEINA.

BY V. T. CHAMBERS, COVINGTON, KY.

BATRACHEDRA.

B. striolata ? Zell.

(*Asychna* ? *pulvella* Cham.)

In "The Bulletin of the Geo. Survey," v. 3, p. 134, I have referred to two species or varieties of *Batrachedra* found by me in Colorado. Some of these specimens found at Colorado Springs I referred doubtfully to the European species *B. præangusta*. Others found higher up the mountains I named *B. Clemensella*, stating, however, the doubt whether the two forms were really distinct. After the greater portion of that paper was in the hands of the publisher, I received from Mr. Stainton two specimens of *præangusta*, by which I was enabled to recognise my *B. Clemensella* as a variety simply of that species, and to increase my doubts whether the supposed species were really distinct; for while *Clemensella*

differed slightly from the true *præangusta* in being a little larger and darker, with a slightly different arrangement of the colors, my supposed *præangusta* differed still more from it in the opposite direction, being smaller, with less of the dark colors and also in a slightly different arrangement of them. The European specimens were between my supposed *præangusta* and my *Clemensella* from Colorado, but nearer to the latter. I have no hesitation in referring my *Clemensella* to the true *præangusta*, and I feel very strongly inclined to refer my supposed *præangusta* also to that species, notwithstanding that two out of six specimens of it agree closely with Zeller's description of *B. striolata*, described by him from Texas. I have not been able to recognise any of my specimens in Dr. Clemens' description of *B. salicipomonella*, though those that agree most nearly with the European *præangusta* agree also best with Dr. Clemens' description of *salicipomonella*. In his edition of the Clemens papers, Mr. Stainton, who had seen both *salicipomonella* and the European *præangusta*, says nothing about the question as to whether the forms are distinct, and gives Dr. Clemens' account of *salicipomonella* without comment. Nevertheless, from correspondence with him, I infer (perhaps unwarrantably) that he is not altogether convinced that they are distinct species.

In Vol. 8 of the CANADIAN ENTOMOLOGIST, p. 171, I have described under the name of *Asychna? pulvella* (with the statement that it was not by any means a true *Asychna*) a species which was taken on willow trees in Kentucky, and which approaches nearly *B. striolata* Zell. and the form from Colorado which I first referred, as above stated, to *præangusta*. In these specimens the fore wings are sordid or yellowish white, dusted with fuscous, with a brown streak on the fold, another on the disc and a white spot at the end of the cell; another specimen taken in Kentucky since then has the streak on the fold and a brown spot at the end of the cell—none on the disc. My Kentucky specimens measure from $4\frac{1}{2}$ to 5 lines *alar ex.*; those from Colorado that I referred to *præangusta* (= *striolata* Zell.) measured 5 lines; Mr. Stainton gives $5\frac{1}{2}$ lines as the *alar ex.* of *salicipomonella*, and 7 as that of the true *præangusta*. Zeller gives — as that of *striolata*; and the specimens from Colorado which I named *Clemensella*, but now refer to *præangusta*, measured a little over 7 lines. I doubt greatly whether all are not referable to a single species, *præangusta*, or at most to only two, which are best represented by *præangusta* and *striolata*.

I was led into the error of refering the Kentucky specimens to *Asychna*? by getting hold of the wrong figures of the neururation—combining the neururation of *Bedellia somulentella* with the external characters of *Batrachedra*.

PERIMEDE.

P. erransella Cham.

In perfectly fresh specimens each of the four small tufts of raised scales on the fore wings is seen to be margined behind with white; there is a minute blackish spot at the extreme tip margined before with white, a minute white costal spot containing raised scales at the beginning of the ciliæ, and a row of minute white specks of raised scales around the base of the ciliæ. On the under side these spots are seen reversed, that is, the scales around the base of the ciliæ are whitish, and the specks dark brown; there is also a minute brown spot at the apex of the hind wings on the under surface. The tarsi are brown, prettily annulate with white.

The account given at p. 51, v. 6, of the neururation is slightly incorrect; there is (at least in some specimens) one more subcostal branch than is there stated, in the fore wings. The neururation of both wings is thus almost exactly that of *Laverna Staintoni*, as figured *Ins. Brit.*, v. 3. The wings are, however, a little more elongate and are narrower. It is closely allied to *Laverna*, but the palpi are nearly as slender as those of the figure of *Anybia langiella* (*Ins. Brit.*, v. 3), though much shorter—rather like those of *Chrysodista liniella* (*loc. cit.*) Its position in repose is singular for an insect so near to *Laverna*; the face is applied to the surface on which it rests, and the abdomen and wings elevated as it rests on the two anterior pairs of legs, with the third pair drawn up alongside the abdomen under the wings—more like an *Argyresthia* than a *Laverna*.

RAVAGES OF WHITE ANTS.—The Commissioner of Agriculture recently received from the Consul General at Monrovia, Liberia, a box of twelve books, principally United States public documents, that had been badly damaged by white ants, in several cases more than a third of the book having been destroyed entirely. The damage was done in the space of a few months while the Consul was absent. It is stated in the letter accompanying, that to preserve books and papers from the ravages of this insect, they must be kept free from dust and well exposed to the air.—*Field and Forest*.

INSECTS OF THE NORTHERN PARTS OF BRITISH AMERICA.

COMPILED BY REV. C. J. S. BETHUNE, M. A.

From Kirby's Fauna Boreali-Americana : Insecta.

(Continued from Vol. vii., p. 159.)

[254.] V.—HYMENOPTERA.

[257.] FAMILY SIRICIDÆ.

356. *SIREX JUVENCUS* Linn.—Length of body, mucro included, 11 lines; expansion of wings 20 lines. One specimen taken in Lat. 65°.

Body black-blue, glossy, punctured very thickly on the head and trunk, in which from each puncture proceeds a black hair. Head between globose and triangular, very hairy with a naked spot behind the eyes; cheek terminating in a tooth or point as in the other species of the genus; vertex blue-green; antennæ black, shorter than the thorax; palpi piceous; trunk subglobose, with the central part of the thorax and the part between the four anterior legs tinted with green; legs rufous with the coxæ and trochanters black; wings hyaline with piceous nervures; abdomen naked, terminated by a subtriangular acuminate mucro or horn; ovipositor piceous.

In this specimen the ovipositor is longer and goes further beyond the anal horn than in the European ones, and the horn itself is more dilated at the base.

[258.] FAMILY FÆNIDÆ.

357. *FÆNUS JACULATOR* Linn.—Two specimens taken in Lat. 65°.

The American specimens differ from those of Europe, which also vary, in having the red segments of the abdomen marked with a large black basilar dorsal spot, the former having mostly only a darker cloud. Panzer's figure, however, comes very near the American.

[It is doubtful that the European species occurs in America; they are probably distinct.]

FAMILY ICHNEUMONIDÆ.

358. *ICHNEUMON FERRUGATOR Kirby*.—Length of body 7 lines. Taken in the Expedition, but no locality stated.

[259.] Abdomen black, rather glossy, very thickly punctured with minute and often confluent punctures. Head transverse, triangular, not quite so wide as the middle of the trunk; anterior margin of the face rounded; palpi reddish; eyes long, subelliptical; antennæ shorter than the trunk, spirally convoluted; trunk oblong, subcompressed; scutellum subtriangular, rounded at the apex; metathorax armed on each side with a short tooth, with several elevated longitudinal and oblique lines; legs with decumbent whitish hairs, anterior tibiæ obscurely, and all the tarsi, rufous; wings embrowned with a rufous tint, nervures darker; abdomen lineari-lanceolate, rufo-ferruginous, with the first joint, which is dilated at the apex, black; footstalk channelled longitudinally on each side.

FAMILY CRYPTIDÆ.

359. *CRYPTUS VIDUATORIUS Fabr.*—Length of body, with ovipositor, $5\frac{1}{4}$ lines; do, without ovipositor, $3\frac{1}{2}$ lines. One specimen taken in Lat. 54° .

Body black. Head subtriangular, transverse, very minutely and thickly punctured; palpi pale rufous; face plane with two elevations in the middle; eyes large, oval; antennæ shorter than the trunk, rather slender, involute, black with a white band in the middle; orbit of the eyes behind with a very indistinct white line; trunk oblong, cubical, gibbous, very thickly and confluent punctured except on the back; tegulæ white; metathorax armed with two minute teeth on each side, one in the middle and the other at the base, forming the terminal angle, marked out into three areas by elevated lines; legs red with coxæ, trochanters, and posterior tarsi black; wings subtestaceous with the larger nervures black; abdomen, excluding the ovipositor, scarcely so long as the trunk; first segment impunctured, glossy, dilated at the apex, which is subquad-rangular; footstalk flat; second and third segments very large, with their gloss obscured by infinitely minute punctures; ovipositor shorter than the abdomen; borer red.

[260.] GENUS CRYPTOCENTRUM.

Head between transverse and globose ; face quadrangular, with the anterior margin crenate ; palpi long, filiform ; antennæ slender, first joint thick ; second minute ; third longer than the rest ; trunk ovate-oblong, subcompressed ; neck moderately long ; scutellum trapezoidal ; legs slender, posterior pair elongated ; upper wings-apical areolets three ; middle four, viz., 2, 2, without a cellule ; basilar three ; under wings-areolets seven, viz., 4, 3 ; abdomen sessile, smooth, subcompressed, in the female clubbed at the apex ; four first segments longer than the rest, the first curved, rather wider at the apex : the three next are wider than long, the last is minute and triangular ; at the extremity the tail is cleft for the passage of the ovipositor ; this cleft is formed by the turning up of the sides of the last ventral segment ; ovipositor very short ; the four last ventral segments, at least in the dead insect, project so as to form an elevated ridge in which the ovipositor is concealed.

360. CRYPTOCENTRUM LINEOLATUM *Kirby*.—Plate vi., fig. 1.—Length of body 6 lines. A single specimen taken in Lat. 65°.

Body very black, somewhat glossy, sprinkled with whitish decumbent hairs. Head subtransverse, hollowed out behind to receive the neck ; face with a streak on each side the eyes ; feelers and scape of the antennæ on the outside white ; antennæ slender, black, externally obscurely testaceous, with a white annulet below the middle ; trunk compressed ; margin of the collar on each side, tegulae, and two transverse elevated streaks on the scutellum, white ; four anterior legs with the coxae and trochanters, tip of the thigh and under side of the tibiae, white ; the thighs, except the tip, testaceous ; upper side of the tibiae and tarsi, and long posterior legs, black ; wings hyaline with black nervures ; abdomen sessile, with the last segments dilated for the reception of the ovipositor ; the apical margin of all the segments but the two first is interruptedly white ; but in those segments the interruption is not perfect.

[261.] FAMILY BRACONIDÆ.

361. BRACON CROCATOR *Kirby*.—Length of body without ovipositor 3 lines. A single specimen taken in Lat. 65°.

Body very black, glossy. Head subglobose, with the segment of a circle taken out behind ; eyes between oval and round ; antennæ as long

as the trunk ; trunk oblong, widest between the wings ; scutellum rather large, rounded at the apex ; metathorax obsoletely transversely wrinkled, sloping towards the abdomen ; posterior legs rather robust ; wings embrowned, middle areolets four, viz., 3 and 1, all quadrangular ; stigma very large ; abdomen lanceolate-ovate, as long as the trunk, saffron coloured, paler towards the apex ; the three first segments are emarginate, and marked with two longitudinal faint furrows, the first pair being curvilinear ; ovipositor longer than the body, borer red.

FAMILY FORMICIDÆ.

[262.] 362. *FORMICA SEMIPUNCTATA Kirby*.—Length of body $7\frac{3}{4}$ lines. Several taken in Journey from New York to Cumberland-house.

Body black, glossy. Head something wider than the trunk, subtriangular ; antennæ piceous with the scape black ; wings cast in all the specimens ; scale vertical between the trunk and abdomen, sloping to a thin edge upwards, where it is very slightly emarginate ; abdomen oblong, subcylindrical, minutely punctured with the punctures piliform ; hairs decumbent with those of the margin of the segments and the anus, longer ; margin of both abdominal and ventral segments membranous, membrane reddish ; base of the three intermediate segments not punctured.

363. *FORMICA FUSCA Linn.*—Length of body $1\frac{1}{4}$ line. One specimen taken in Lat. 65° .

[263.] ♀.—Body black, but not intensely, glossy, subcinereous from down. Head triangular, large, much wider than the trunk ; antennæ with the scape, the three following joints, and the terminal one, rufous ; the other joints are darker ; trunk oblong, compressed, anteriorly elevated and wider ; the prothorax with the scutellum forming a rhomboid ; scutellum large, trapezoidal, subrufous ; scale subtriangular, subemarginate ; legs rufous ; thighs embrowned ; abdomen subglobose, more hairy than the rest of the body, especially towards the anus.

FAMILY VESPIDÆ.

364. *VESPA VULGARIS Linn.*—Length of body $6\frac{1}{2}$ lines. A single specimen taken in Lat. 65° .

[264.] ♀.—Body black, variegated with yellow. Head and trunk thickly clothed with long woolly down of a grayish colour; face with three yellow spots placed in a transverse line behind the antennae, the two lateral ones subtriangular, the intermediate one subquadrangular, with a reddish cloud on its disk; the nose below the antennae is yellow, inclining to red round the margin; it has also three black dots placed in a triangle in the disk, the two lower ones being very minute; the vertex of the nose is also black; the mandibles are yellow with black tips; on the outside the orbit of the eyes is reddish-yellow; the trunk is black underneath; above the posterior upper margin of the collar, the tegulae which cover the base of the wings, and a triangular spot underneath them, are yellow; on the metathorax and scutellum are six yellow spots placed in a double series, the upper and lower pairs being subtriangular, and the intermediate pair crescent-shaped; the thighs are black at the base, but their apex, and the rest of the leg, and a small triangular spot on the inner side of the four posterior trochanters, are yellow; the wings are yellowish red with red nervures; the abdomen, except at the base, is less hairy than the rest of the body; it is yellow with all the segments black at the base; though the blackness in the terminal ones is chiefly concealed by the antecedent segments; in all in the middle it projects into a triangle; the four intermediate ones have also each a round-headed small black spot, the connection of which with the blackness of the base is interrupted in the second segment; on the under side of the abdomen the base of the segments is black, and the intermediate ones have each a pair of rather crescent-shaped black spots not connected with the blackness of the base.

[Kirby states that the specimen above described differs somewhat from the European wasps of this species, but he considers it to be merely a variety of the latter. Later authors state that both *V. vulgaris* and *V. germanica*, European species, are found on this side of the Atlantic.]

365. *VESPA BOREALIS* Kirby.—Length of body $7\frac{1}{2}$ lines. A single specimen taken with the last.

[265.] Body black, downy, especially the head and trunk, with gray hairs. Nose trapezoidal, yellow with a black floriform discoidal spot; anterior margin with three sinuses taken out; vertex with a trapezoidal yellow spot just above the base of the antennae; antennae black, luteous

underneath ; external orbit of the eyes and mandibles yellow ; lateral margin of the collar, a triangular small spot under each wing, two narrow transverse and internally acute spots on the scutellum, and two similar ones below them on the metathorax, all white ; tegulæ white with a brownish spot in the disk ; legs yellow ; thighs black at the base ; wings testaceous ; abdomen heart-shaped, with the bases of the segments where uncovered, and two dots on each except the first, black ; the middle part of the black basal bands projects into a triangular tooth ; the under side is nearly similar, but the projections form a longitudinal stripe.

366. *VESPA MARGINATA Kirby*.—Plate vi., fig. 2.—Length of body $7\frac{1}{2}$ lines. Taken in the route from New York, and again in Lat. 65° .

♀.—Body black, punctured, downy from a mixture of black and gray hairs. Mandibles white with a black margin ; palpi reddish ; nose white with a flask-shaped longitudinal black spot in the disk ; just above the antennae is a bilobed white spot, between which and the eye is a white line, and another external one above it ; antennae short, not much exceeding the head, black with the scape white underneath ; in one of the specimens there is a reddish spot underneath on the four or five last joints, which is not discernible in the others ; the external margin of the collar, before each wing, and a small triangular spot on each side of the scutellum, are white ; wings embrowned with darker nervures, but the costal nervure and tegulae are ferruginous ; legs testaceous, black at the base ; abdomen with the apex of the dorsal and ventral segments white ; anal segment black with a pair of white spots ; the white margin of the dorsal segments receives an intermediate triangular point, and on each side of it a rounded lobe from the black base.

[266.] 367. *VESPA MACULATA Linn.*—Length of body 10 lines. A single specimen taken in Lat. 65° .

[As this insect, commonly known as the "White-faced Hornet," is so abundant in Canada, and has been so often described, it is unnecessary to quote Kirby's description.]

FAMILY PROSOPIDÆ.

368. *PROSOPIS ELLIPTICA Kirby*.—Length of body 3 lines. Three specimens taken in Lat. 65° .

[267.] Body very black, slightly downy, minutely punctured. Apex of the nose white, whiteness lobed; inner orbit of the eyes below the antennae white; vertex channelled below the eyelets; antennae scarcely longer than the head; the projecting lobes of the collar terminate in a white tubercle; base-covers piceous; wings hyaline with dark nervures; metathorax longitudinally wrinkled; posterior tibiae annulated at the base with white; abdomen more glossy than the rest of the body, almost naked, and scarcely punctured; it is narrower and more elliptical than in any other known species of the genus.

[This species and another, *P. affinis* Smith, are found in Canada.]

FAMILY ANDRENIDÆ.

369. *HALICTUS RUBICUNDUS* Stephens.—Length of body 5 lines. Four specimens taken, locality not stated.

♀.—Body black, downy. Head suborbicular, down grayish; space between the eyes broad; down on the thorax thicker, ferruginous; base-covers rufo-piceous; wings subhyaline; nervures and stigma testaceous; post-costal nervure black; legs thickly set with yellow hairs which shine like gold; tarsi testaceous; abdomen elliptical, downy with decumbent hairs; margin of the segments fringed with white hairs, the two first sub-interruptedly; the ventral segments are similarly fringed, but the hairs are shorter.

370. *HALICTUS CRASSICORNIS* Kirby.—Length of body 3 lines. A single specimen taken in Lat. 54°.

[268.] ♀.—This little insect is so extremely like *Halictus levis*, that at first I regarded it merely as a variety of that species, but upon a closer inspection they appear to me distinct. In *H. crassicornis* the antennae are proportionally more robust, but the principal difference lies in the sculpture of the thorax. In *H. levis* that part is *visibly* punctured with scattered punctures, but in the insect I am describing, under a common lens, the punctures are scarcely discernible, but under a higher power, besides a slight channel drawn longitudinally, innumerable very minute punctures appear. In the former also the stigma of the upper wings is piceous, while in the latter it is testaceous. In other respects they are perfectly similar.

371. *ANDRENA IMPUNCTA* Kirby.—Length of body 5½ lines. A

single specimen taken in the Journey from New York to Cumberland-house.

♀.—Body black, clothed with rather long whitish hairs, especially the face below the antennae ; hairs of the thorax rufescent ; wings subhyaline a little darker at the tip ; nervures testaceous, post-costal black ; brush of the posterior tibia white ; abdomen impunctured with the hairs of its anterior half white ; the other hairs above and below black.

372. *ANDRENA VARIANS* Ross.—Length of body $5\frac{1}{2}$ lines. Three specimens taken, locality not stated.

[269.] ♀.—Very like the species just described, but the head is clothed with black hair ; that of the thorax and base of the abdomen is tawny-red ; the brush of the posterior tibia is changeable, as the site varies, from black to white ; the hairs of the under side of the body and of the last abdominal segment above are black, except those on the posterior thighs forming the flocculus, which are whitish, as are those of the anterior part of the abdomen.

FAMILY NOMADIDÆ.

373. *NOMADA AMERICANA* Kirby.—Plate vi., fig. 3.—Length of body $4\frac{1}{2}$ lines. A single specimen taken in Lat. 65° .

Body dark-ferruginous. Thorax with a longitudinal mesal black line, less distinct on the metathorax ; breast with a black spot on each side ; wings, as in the rest of the genus, embrowned with a white spot near the tip ; thighs black at the base on the under side ; first segment of the abdomen black at the base, and, with the second and third, brown at the apex.

This is the only American *Nomada* I ever saw, and Fabricius describes none from that country. It comes near *Nomada ruficornis* and *striata*, but it has only a single black stripe on the thorax.

[Dr. Packard states that these Cuckoo-bees, the *Nomada*, are very numerous in America.]

[270.] FAMILY CHELOSTOMIDÆ.

374. *CHELOSTOMA ALBIFRONS* Kirby.—Length of body $4\frac{1}{2}$ lines. A single specimen taken in Lat. 65° .

♂.—Body black, thickly punctured. Mouth bearded with white; mandibles carinated above, armed with two strong terminal teeth; nose square, flat, clothed with decumbent silver pile; antennae filiform; scape black; the other joints are rufo-piceous underneath; trunk very hirsute with white or subcinereous hairs; wings a little embrowned, with black veins and base-covers; legs hairy; abdomen subcylindrical, hirsute with black hairs, incurved with the apex of the four intermediate segments fringed with white hairs; anal joint with a concavity above, obtuse; last ventral segment forcipate, rufo-piceous

NEW SPECIES OF LEPIDOPTERA.

BY A. R. GROTE,

Director of the Museum, Buffalo Society Natural Sciences.

Scopelosoma tristigmata, n. s.

This form, or species, belongs to the series of *Walkeri* and *vinulenta*, of the former of which I was at first disposed to consider it a variety. It is distinguished by the presence of all three of the ordinary spots. Rusty ochre; t. a. line single, even, blackish with the small rusty outlined clavi-form attached. Orbicular rusty-ringed, with pale centre, small. Reniform pale ochre, rusty-ringed, well sized, of the ordinary shape, with a black inferior stain. Median shade a little waved, joining the reniform above and issuing from it inferiorly. T. p. line much as in *Walkeri*, with the three black streaks on the median nervules unusually distinct. S. t. line margined before with a fuscous shade, pale, irregular; terminal space contrasting, fuscous, with the veins black-marked. Fringes ochreous. Hind wings blackish fuscous, with ochrey fringe. Head and thorax rusty ochre; antennae paler at base; abdomen fuscous, rusty ochre at sides and tip and beneath. Wings ochreous beneath, with common shade band, flexed on hind wings, which show a discal mark. Expanse 35 mil. Newtonville, Mass., No. 8, April 23, Mr. Roland Thaxter.

Tarache abdominalis, n. s.

This species is parallel with *aprica* and may be distinguished by the blackish abdomen, ringed with white. It varies in the color of primaries and thorax. In some specimens the fore wings are white from the base to exterior line with two dark costal patches as in the type *aprica*. The exterior line is heavier and more metallic than in *aprica*. The subterminal line is notably less inwardly projected than in *aprica* below the median nervules. Again, the fore wings are more or less blackish at base, leaving two white costal blotches as in *biplaga*. Beneath the two forms are to be quickly distinguished. In *abdominalis* the wings are yellowish, the hind wings with a terminal blackish band, two discal longitudinal rays from the base and a transverse fascia broadly marked on costa in the best marked specimens; the rays and transverse fascia become more or less obsolete. Above the hind wings are black or blackish, sometimes pale yellowish on disc, always darker than in *aprica*. Thorax and head blackish; tegulae more or less white on the sides. Expanse 25 mil. Hab. Texas (Belfrage No. 596); also collected by Heiligbrodt, in Mr. Meske's collection. The colors of the dark outer portion of the fore wings are brighter than in *aprica*, the band before t. p. line more olivaceous, the subterminal line more tinged with brown. I have to thank Mr. v. Meske for drawing my attention to this form, which from the description cannot be *obatra* of Mr. Morrison.

Geometra rectaria, n. s.

♂. This species is smaller than *iridaria*, of a rather more dull green and with one-half narrower white lines. Costa of primaries whitish, much marbled with fuscous. Inner white line of primaries perfectly *straight*. Outer line extending across hind wings in same position as in *iridaria*. Minute black discal points on both wings. Fringes concolorous, not paler as in *iridaria*. Head white; palpi brown at tips. Legs white with black dots at extremities of second and third joints. Beneath secondaries a little paler than primaries, on which alone the minute black discal points are legible. The common exterior line is indistinctly shown. Tegulae and collar green; dorsum of thorax discolorous. Expanse 25 mil. Hab. Texas (Belfrage, No. 323).

This species differs from Mr. Walker's descriptions of forms unidentified by Dr. Packard more broadly than from *iridaria*. The wings and body are proportioned as in *iridaria*. From the description I should not refer

Geometra mimicata Walk. to this genus. *G. rectaria* may be included by Dr. Packard among his Texan material of *iridaria*, but I do not think it is the same; the green fringes seem shorter, the narrow lines, the inner one on primaries perfectly straight and the more brown and inconspicuous costal edging are as strong as specific characters seem to be in this group. The dot on hind wings beneath is obsolete; there are no white markings on the veins.

ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The annual meeting of this Club will be held at Nashville, Tenn., on Tuesday, the 28th of August, at 3 p. m. The regular meetings of the Association will commence on the following day. The pleasures connected with the annual re-union of Entomologists during the meetings of the Club will, we doubt not, attract to Nashville many of the "brethren of the net." The citizens of Nashville are offering private hospitality to all the members of the Association who will accept it, and have also made arrangements for hotel accommodations and railway tickets at reduced rates. We hope to hear of a large attendance.

CLISIOCAMPA SYLVATICA — THE FOREST TENT CATERPILLAR.

BY THE EDITOR.

The larvæ of this moth (see fig. 6) have been enormously abundant this season in the vicinity of London, Ontario. Vast swarms numbering millions upon millions consumed the foliage of fruit and forest trees during

the latter part of May and the early weeks of June. By the 5th of the latter month they had become about two-thirds grown, when the daily consumption of foliage was so immense that their presence attracted general attention and the most vigorous onslaughts were made on them from all sides. But notwithstanding they were slain every day by

Fig. 6.



millions, their numbers seemed scarcely to diminish. In many places the forests by the middle of June were so completely denuded that they afforded but little more shade than in mid-winter, trees of all kinds suffering severely. They attacked the oak, ash, basswood, maple, thorn, cherry, beech and hickory, as well as almost all sorts of fruit and ornamental trees, and during June their activity in travelling from place to place was so incessant that the most constant vigilance was required to save favorite trees from destruction. Their habit of congregating in large masses on the trunks of the trees they fed on in the mornings rendered their partial destruction comparatively easy; had it not been for this scarcely a leaf would have been left on any of the trees named in the whole neighborhood.

When the larvæ began to change to chrysalids they sewed up the remaining fragments of the few leaves still unconsumed on the trees into all kinds of curious shapes, each enclosure frequently protecting two or three cocoons. These cases hanging pendant with the weight of their contents, and with the paler under surfaces of the leaves displayed, looked in many instances as if a crop of some strange fruit was maturing. On gathering a number of the chrysalids, a very large proportion of them were found infested with parasites, chiefly dipterous, with occasional examples of the hymenopterous order.

Early in July the evenings were enlivened by large numbers of the moths which flew vigorously about in lighted rooms, thumping against everything in their erratic and apparently aimless flight. In a few days their egg masses were to be seen in considerable numbers on the branches of fruit and forest trees, where they will remain, unless otherwise destroyed, until the period of their hatching next spring.

MISCELLANEOUS.

PAPILIO THOAS.—On the 1st and 2nd of August, I had the pleasure of capturing in a field near Amherstburg, Ontario, eleven specimens of *Papilio thoas*, most of them in good condition, besides a number of other species of butterflies. The specimens of *thoas* were all taken on the flowers of thistles.—J. M. DENTON, London.

CISTHENE SUBJECTA.—Early in July the writer captured two specimens of this elegant little moth, generally very rare here, on the blossoms of Milkweed (*Asclepias cornuti*). Their legs had been caught in the sticky substance which exudes from the sides of the flowers, and thus they were held firmly.—ED. C. E.

MELITAEA PHAETON.—For two or three years past I have searched in vain throughout this locality for *M. phaeton*, but this season I have taken all that I wanted; indeed, they were so abundant that at one time I might have taken a hundred in a few hours had I wished to do so. I have taken also a specimen of *Myrmeleon obsoletus* Say, and one of *Psycomorpha epimenis* Drury, both rare in this neighborhood.—J. ELWYN BATES, South Abington, Mass.

AMBLICHYLA CYLINDRIFORMIS.—We are indebted to our friend, Mr. S. W. Williston, of New Haven, Conn., for a very fine specimen of this hitherto rare insect, which reached us by mail from Kansas in excellent condition. On opening the small tin box in which it had been confined, it seemed as healthy and vigorous as possible, moving briskly around in its endeavors to escape. It is a very handsome creature, and will prove a most acceptable addition to our cabinet.—ED. C. E.

FOOD PLANT OF S. CECROPIA.—We have taken the larvæ of *cecropia* this year feeding on the European Alder; they were nearly full grown, and the amount of foliage consumed on the young trees left little doubt that the eggs had been laid and the larvæ matured entirely on these trees.—ED. C. E.

I have taken at sugar this season *Sphinx Kalmie* and *myron*.

Is it not unusual to see *Catocala* about in day time? Recently I took *C. subnata* feeding on the edge of a swill barrel at mid-day—the barrel standing in the shade, however.—W. L. DEVEREAUX, Clyde, N. Y.

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A NEW LEPIDOPTEROUS INSECT INJURIOUS TO VEGETATION.

BY A. R. GROTE,

Director of the Museum, Buffalo Society Natural Sciences.

(Read before the Am. Asso. Adv. Sci., August 30, 1877.)

In the months of June and July the Red Pine (*Pinus resinosa*) and the White Pine (*Pinus strobus*) show by the exuding pitch that they are suffering from the attacks of an insect. The wounds occur on the main stem below the insertion of the branch. On cutting into the bark the injury is found to be caused by a small larva, which, when full grown, measures 16 to 18 millimetres. The head is shining chestnut brown with black mandibles. The body is livid or blackish green, naked, with series of black dots, each dot giving rise to a single, rather stout, bristle. The prothoracic shield is blackish. The larva has three pair of thoracic or true jointed feet, and four abdominal or false feet, besides anal claspers. This larva, eating on the inner side of the bark, and making furrows in the wood, causes the bleeding which, when the depletion is excessive or continuous, and especially in the case of young trees, has proved fatal.

In July the worm spins a whitish, thin, papery cocoon in the mass of exuding pitch, which seems to act as a protection to both the larva and the chrysalis. The chrysalis contained in the cocoon is cylindrical, smooth, narrow, blackish-brown, about 16 millimeters in length. The head is pointed, there being a pronounced clypeal protuberance; the segments are unarmed; the anal plate is provided with a row of four spines, and two others, more slender, on either side of the mesial line, below the first. It gives the moth in ten to fourteen days. The perfect

insect expands on an average 30 millimeters. An examination of the veins of the wing shows that vein 7 of the primaries is wanting, while vein 1 is simple. On the hind wing the cell is closed or very nearly so. It belongs thus to the *Phycidæ*, a sub-family of the *Pyrallidæ*. The male antennæ are bent a little at the base, the joints inconspicuous; the maxillary palpi in the same sex are not brush-like, and the hind wings are 8 and not 7-veined. We may refer the moth, then, to the genus *Nephopteryx*. Veins 3, 4 and 5 spring nearly together from the outer extremity of cell of the hind wings (though 5 seems to be nearly independent while running close to 4); vein 2 is not far removed from 3. On the primaries veins 4 and 5 spring from a common stalk, so that we must refer the moth to the sub-genus *Dioryctria* of Zeller. In color the moth is blackish gray, shaded with reddish on the basal and terminal fields of the fore wings. There are patches or lines of *raised* scales on the basal field and on the anterior and darker portion of the medium space. The median lines are prominent, consisting of double black lines enclosing pale bands. The inner line at basal third is perpendicular, W-shaped or dentate. The outer line at apical fourth is once more strongly indented below costa. The black component lines do not seem to be more distinct on one side than on the other of the pale included bands or spaces. The median field is blackish, becoming pale towards the outer line; it shows a pale, sometimes whitish cellular spot, surmounted with raised scales. It can be seen that these raised scales (easily lost in setting the insect) accompany the median lines as well as forming the discal mark and the linear patch on the basal field. The terminal edge of the wing is again pale or ruddy before the terminal black line. The fringes are blackish. The hind wings are pale yellowish white, shaded with fuscous on costal region and more or less terminally before the blackish terminal black line; the fringes are dusky. Beneath the fore wings are blackish, marked with pale on costa; hind wings as on upper surface. Body blackish gray, with often a reddish cast on thorax above and on the vertex. The eyes are naked, the labial palpi long, ascending, with moderate terminal joint. Tongue rather long. The gray abdomen is annulated with dirty white, the legs are pale dotted. The species differs from the European *abietella* by the raised scale tufts on the wings, and Prof. P. C. Zeller, who has kindly compared examples for me, declares it to be quite distinct from any European species. The pupa seems to differ from that of *abietella* by the clypeal prominence, which appears entirely absent in the European

species, judging from Ratzburg's excellent figures. The larva is found to attack also various imported conifers ; for this reason I supposed it might be an imported parasite. It has been noticed on the Scotch, Austrian and Russian Pine, and it will be found, I fear, a grave enemy to the cultivation of this genus of plants.

Since the insect is not noticed yet in any scientific publication, I propose to name it *Nephopteryx (Dioryctria) Zimmermani*, after Charles D. Zimmerman, of Buffalo, who has made many excellent observations on our noxious insects, and to whom I am greatly indebted for help in getting the present facts with relation to the species. He has kindly spent much time in climbing large trees and cutting out pupæ and larvæ and rearing the perfect insect.

The larva of *abietella* is described by Ratzburg as living in the cones chiefly of various species of *Pinus*. Nevertheless, he speaks of one instance in which it is found under similar circumstances to those which are usual with *Zimmermani*, which latter I have not yet noticed attacking the fruit. The European species is said to winter in pupa state. In the vicinity of Buffalo our species seems to be single brooded. I have not yet ascertained the winter state. Ratzburg recommends cutting off infested branches, but especially on small trees. I find the larva of *Zimmermani* usually infesting the *main* stem at the insertion of the branches. From the fact that the pitch of the trees offer a protection, I do not think that any washes would reach the insect. The knife, then, seems the only remedy.

Our species has a natural enemy in a small hymenopterous parasite with which I have found certain of the chrysalids to be filled.

ON THE HABITS OF AMBLYCHILA CYLINDRIFORMIS.

BY S. W. WILLISTON, NEW HAVEN, CONN.

The great interest in which this beetle has been held by Entomologists for so long has rendered an accurate account of its habits very desirable ; but for a very long period—over twenty years—it has singularly eluded more experienced observers. In the Proceedings of the

Kansas Academy of Science for 1876, a slight account was published by Mr. H. A. Brous, but from the very small number taken by him, his article was necessarily imperfect. I have taken more than five hundred living specimens from the plains of Western Kansas during the past two years, and have watched their habits closely. Without being aware of Dr. LeConte's suggestion as to their nocturnal habits, one would readily arrive at that conclusion from the large numbers of their remains constantly met with scattered about, or in the excrement of nocturnal birds. With the first living specimen their peculiar habitat was readily understood. They may be met with in great abundance on gently sloping banks of firm loam, but partially covered with vegetation; they will not live in banks at all sandy. They never burrow, but enter any convenient hole at the approach of the sun, to come out again and wander in search of food at sunset. In cloudy days they will remain out, but with the first sunlight they disappear into their retreats, not to return until evening. The first one taken this year was on a pleasant evening in May, the 21st; but, though hunted for assiduously, no more were taken till near the middle of June. In a week or two later they were found in the greatest abundance.

The males, at first numerous, invariably soon begin to decrease in number, and are more abundant early in the evening. By the middle of September the females also have become rare.

The eggs are deposited near the surface of the ground, in groups of from one to two dozen. The young larvæ immediately burrow downwards, but come to the surface at dark to lie in wait for food, which consists mostly of ants and small insects. The holes are extended to surprising depths. In some instances I have traced them for nearly three feet. The mature larvæ are over two inches long, with very strong mandibles and maxillæ. They may be found most readily either in May or August. Singularly unlike the imago, they are very shy and easily alarmed.

The adult beetle might very appropriately be called stupid. Their power of sight is *extremely* feeble. Wandering aimlessly about in search of food, they are first apprised of their prey by their antennæ, when by a short, sudden spring they fasten their relentless mandibles into their victim.

Their food consists in large part of the smaller apterous Tenebrionidæ, such as the *Eleodes* or *Asideæ* that are found on the plains in such abundance, especially during the time and in the places so peculiar to the

Amblychila. Such Orthoptera as they are able to seize, they eat with the greatest avidity, but it is *very* rarely that they are able to catch any but the slow moving walking-sticks. They also devour a great many ants. They never feed on effete or decayed matter.

A dozen or more, when confined in a small space, will rarely injure one another, but are readily kept captive, eating any fresh animal food and even thriving on fresh meat. Their appetite is by no means small! They never heed an observer or collector till touched.

The males in the great majority of cases are larger than the females and may be readily distinguished by the sharp-pointed trochanters of the hind coxæ.

DESCRIPTION OF THE PREPARATORY STAGES OF PHYCIODES HARRISII, SCUDDER.

BY W. H. EDWARDS, COALBURGH, W. VA.

I received, 25th June, from Mr. C. P. Whitney, New Milford, N. H., a cluster of about 50 eggs of this species, laid on the under side of a leaf of *Diplopappus umbellatus*, date of deposition not stated. The larvæ hatched 28th June. The food plant not being obtainable by me, I gave them leaves of *Chelone glabra*, on which *phacton* feeds, but so long as the least bit of the dry leaf of *Diplopappus* on which they hatched remained, the larvæ declined the *Chelone*, and then after starving many hours they attacked it vigorously. But, meantime, for want of proper food, several died. They manifested alarm just as do the larvæ of *nycteis* and *phacton*, by a jerking motion of the body from side to side, the last segments being fixed to the leaf, and all the larvæ jerking together. This is contrary to the habit of *tharos* so far as observed, nor have I seen it in other species. On 2nd July the first moult was passed, and the larvae now utterly refused *Chelone*, although gnawing the edges of a bit of white paper in their hunger. I gave them Aster and on this they fed readily to the last, eating any species indifferently. On 7th July they were passing second moult, and on 12th and 13th, the third moult. Shortly after this

they stopped feeding and gathered in a cluster on the cover of the glass in which they were kept, and became lethargic. Their behavior throughout was like the larvæ of *nycteis*, though they are cleaner in feeding than that species, which keeps itself in a mire on the leaf. No web at any stage was spun for protection or other purpose, and they are hibernating now on a slight mat of silk made upon the cover of the glass.

Earlier this year, May 24th, I received from Mr. Whitney about a dozen larvæ of this species, found by him soon after awaking from their hibernation. These were of all stages from just after second moult to the fifth, or the mature larva, and one made chrysalis 26th May. From this the butterfly emerged 4th June. Evidently these larvæ hibernate after both second and third moult, as do those of *phaeton* and *nycteis* and *tharos*, though all which I now have in hibernation (16 in number) have passed the third. In all stages the larvæ resemble closely those of *phaeton*, changing from ochraceous, lighter or darker, to deep fulvous, and striped with black. So the spines and their branches are those of *phaeton*, and differ much from *nycteis*, as the coloration of the body differs. The egg also is nearer *phaeton* than *nycteis*, but the sides are more sloping and less rounded, and the ribs spring from the base instead of the middle of the side. The chrysalis is shaped like that of *tharos*, and colored like that of *phaeton*. There is much variation in the coloration in individuals. One of the larvæ was nearly black at maturity, the fulvous being represented merely by a few dots and small spots. The butterfly from this larva is very melanic on both sides, in as strong contrast to the rest of the brood as was the larva. The species is single brooded, like *phaeton*, while *nycteis* is double brooded in W. Va., and *tharos* many brooded.

EGG—In shape a frustum of a cone, flattened at base, the top a little depressed, the sides but little rounded, ribbed, the ribs standing well apart, 15 or 16 in number, and starting from the base, increasing in elevation above the surface as they approach the middle, then decreasing to the summit; color lemon yellow.

YOUNG LARVA—Length $\frac{1}{16}$ inch. ; cylindrical, the segments well rounded; color yellow-green, semi-translucent; somewhat pilose; head obovoid, bilobed, the vertices rounded; larger than second segment; color dark brown.

AFTER FIRST MOULT—Length $\frac{1}{16}$ inch. ; thicker in middle segments; armed with seven rows of short black spines, thick at base,



tapering, and thickly set with short black bristles; there is also a row of small, similar branching spines over the feet; color yellow brown, the second segment quite dark, and on this is a collar of minute branching spines; there is also a dark medio-dorsal line; head obovoid, rather flattened frontally, the vertices rounded; color black brown, with many black hairs.

AFTER SECOND MOULT—Length $1\frac{1}{16}$ inch.; shape and spines as before; color ochre-yellow, with five transverse black lines on the segments, and a dark medio-dorsal line; head as before, black.

AFTER THIRD MOULT—Length $1\frac{3}{16}$ inch.; spines and bristles larger in proportion; color deeper ochre, striped as before.

AFTER FOURTH MOULT—Length $1\frac{5}{16}$ inch.; color red, or orange ochraceous; the transverse lines distinct, and edged unevenly, one before each row of spines and two after; at base of body, on feet, an ochrey ridge; the spines short and stout, with very divergent bristles; head as before, the surface finely tuberculated, black.

AFTER FIFTH MOULT—Length $1\frac{7}{16}$ inch., increasing to $1\frac{8}{16}$, and in one example to one inch at maturity.

MATURE LARVA—Cylindrical, of nearly even diameter throughout; color deep red fulvous, crossed by black stripes, one before and two after each transverse row of spines, and with a medio-dorsal black longitudinal stripe; the last two segments nearly all black, and on 9 to 11 the fulvous bands are macular; the spines on each segment also stand on a broad black band; spines in seven principal rows, one dorsal, three lateral on either side, long, tapering, black, each thickly set with long divergent black hairs, and each rising from a broad, round, shining black, or blue black base; over the feet a similar row of small spines; the second segment with a collar of small branching spines; feet and prolegs black; head obovoid, flattened frontally, cleft, the vertices rather pointed than rounded, black, granulated, and with many short black hairs.

CHRYSLIS—Length $1\frac{1}{16}$ inch.; cylindrical; head case compressed transversely, nearly square at top, bevelled at the sides; mesonotum rounded, not prominent, followed by a slight depression; abdomen stout, with several rows of small sub-conic tubercles, two of which are extended to upper side of mesonotum; color pure white, marked and spotted throughout with black, or brown black, and orange, and showing much variation in individuals; the last segments black; a broad band of black

on the ventral side reaches from the head case to lower end of wing cases, and the abdomen has orange bands between the segments ; on the wing case a curved black band crosses longitudinally, and in this the nervules of the wing are orange ; there is also a row of black dots or small spots about the hind margin ; the tubercles orange, and nearly all have a black crescent on the anterior side ; on the posterior side of the abdominal segments are also small black spots. The coloration varies much, and some examples are almost deprived of the black markings, while retaining the orange.

NOTES ON CATOCALÆ.

BY A. R. GROTE,

Director of the Museum, Buffalo Society Natural Sciences.

Catocala junctura Walk.

Dr. Bailey has taken near Albany a little larger form than *unijuga*, with rather paler primaries and much the same markings. The hind wings are a little more pinkish, without the dusky basal hairs of *unijuga*. The band is a little narrower than in *unijuga* and terminates much before the internal margin. It tallies with my recollection of Walker's type of *junctura* in the British Museum, and I am disposed to think that *junctura* is now rediscovered.

Catocala Anna Grote.

Mr. Thos. E. Bean has taken this species in Illinois. It varies slightly in the terminal band being sometimes entirely broken before anal angle.

Catocala Frederici Grote.

This species, described by me from types in the Royal Museum at Berlin, taken by Friedrichs in Southern Texas, has now been rediscovered by Belfrage in Bosque Co. Mr. Belfrage sends me a specimen under the number "672," taken on pine, which agrees perfectly with the original description and with a water-color drawing made from the Berlin speci-

mens by Tieffenbach, and sent me by the late Prof. Hopffer. The species is a little smaller than *illecta* (*magdalena* Strecker) and may be easily recognised by its pale greenish-gray, mossy primaries, with the lines dusky and rather diffuse. The hind wings are light yellow with the median band straight, terminating before the margin with a short, rather abrupt curve. The terminal band is abbreviate, narrow, scalloped on its outer edge over the median nervules. There is a small black spot on the margin before anal angle. The species is very distinct and can be mistaken for no other.

Catocala abbreviatella Grote.

I have this species from Illinois, taken by Mr. Bean. The t. a. line is straight, outwardly oblique to below median vein, when it becomes obsolete. It is not black shaded as in *Whitneyi*, which I have from the same locality. The three species, *nuptialis* (= *myrrha* Strecker), *abbreviatella* and *Whitneyi*, form a series of allied forms, but can be sufficiently and readily distinguished.

Catocala gracilis Edw.

The form described by Mr. Edwards has the primaries light gray, the lines broken and the internal margin more or less shaded with blackish. The species recalls the concluding *amica* group in the colors, bluish gray primaries and bright hind wings, and I have put it last in the series on this account. I am not certain now what Mr. Edwards' *similis* is. In Mrs. Bridgham's collection is (or rather, was) a specimen labelled *similis* by Mr. Edwards, which belonged to what I consider as a variety of *gracilis*, having the primaries mixed bluish gray, rather dark and somewhat hoary. The lines are distinct, or usually so, and the basal dash of *gracilis* is wanting. This last seems the only important character, but it is present in var. *basalis* of *habilis* and wanting in the type. This dark form (which seems also a little shorter winged) has been taken with the type by myself near Buffalo, and by Dr. Bailey near Albany. I have seen it also from Pennsylvania. In the collection of the Ent. Soc. of Phil. there is a specimen labelled *similis*, which in my "Revision" I have referred to as belonging to this variety of *gracilis*. But Mr. Edwards' description will not agree in this that he says: "beyond is a ferruginous band followed by a gray line which is dilated on the costa so as to make a triangular apical spot." This and the size will not correspond, and it is probable that Mr.

Edwards has described some one other of our yellow-winged smaller species, and has afterwards mistaken his species, or mixed up different forms at the same time. This mixed dark blue-gray form, with distinct black lines and without the small basal streak of *gracilis*, I propose to designate by the name *sordida*; it varies as *gracilis* does in the suffusion of the primaries along internal margin with black in some specimens. Both the description and the type of Mr. Edwards' *parvula* correspond to that form of *minuta* which has this dark suffusion on primaries. *C. minuta* is allied, though a smaller form, to *fratercula*; both forms have the dentate white subterminal line usually obvious. From an examination of Kansas specimens, no doubt remains on my mind that *atarah* is founded on more generally obscure specimens of *fratercula*. An example of *fratercula* in the collection of Dr. Bailey has the primaries suffused with black over the median space.

NOTES ON THE LARVA AND PUPA OF EUCHAETES COLLARIS.

BY G. H. VAN WAGENEN, WESTCHESTER CO., N. Y.

I have, for three seasons, raised *Euchaetes collaris* from the larva, it being very abundant in this locality, and present the following notes as the result of my observations:

The larvæ feed on the *Apocynum androsaemifolium*, or Spreading Dogsbane. They will in confinement feed on *Asclepias*, but I have never, after careful search, found but one of the larvæ on it in the field. They feed at night, leaving their food-plant and hiding themselves during the day. About dusk they will be found crawling up the stems of the *Apocynum*.

Unlike *egle*, which feeds in companies, these are solitary feeders, and I have never found more than two on the same plant; generally there is but one. The color of the hairs in the early stages of the larva is almost white, but changes to slate color when ready to go into the chrysalis.

The early broods go into the chrysalis state about the end of July, and the imago appears in ten days or two weeks. The later broods remain in

the chrysalis during the winter, and emerge in the following June. They spin a slight cocoon between the leaves or on the ground. They are very easily raised, and require little feeding, eating much less than *egle*. The moth appears here from the middle of June to about the middle of July, and again the latter part of August.

I am indebted to Dr. Lintner, of the State Museum at Albany, to whom I mailed specimens of the larvæ and pupæ, for the following scientific description. The Dr. states that these specimens were not in the best condition for the purpose, "having lost many of their hairs from rolling," but on comparing his description with larvæ fresh from the plant, it seems to me perfectly correct.

LARVÆ OF EUCHAETES COLLARIS.

Sub-cylindrical, tapering moderately at the extremities. Head nearly as large as the first segment, pale luteous with black ocelli; body pale bluish white, semi-transparent; the pro-leg bearing segments with twelve rows of tubercles, from which radiate pearl-gray branching hairs varying from sparsely sub-spinose to thickly branched, which dorsally are about the length of the diameter of the body, except on the last three segments, where are some twice as long; the lateral hairs are shorter, but perhaps from attrition; the longer hairs tend to unite at their tips in pencils of a slaty hue. The tubercles, in their location on the segments referred to, alternate between their anterior fourth and posterior third; the sub-dorsal ones are oval, the lateral ones elliptical, the latero-stigmatal sub-rotund, as are also the much smaller stigmatal ones; the form of those of the two inferior rows is not evident. The stigmata are small, narrowly elliptical, white, annulated with black. The legs are unicolorous with the body, the terminal pair quite projected backward.

Length of the larva at rest, .87 inch; in motion, 1.12 inch. Diameter at broadest part, .16 inch.

The cocoons are slight, consisting almost wholly of the hairs of the larva, closely investing the pupa, their length from one-half to five-eighths of an inch, with a diameter of about one-fourth of an inch.

The pupæ are black, closely punctated, ovoid, the terminal segments blunt and unarmed, the thoracic portion projected over the wing-bases in a sub-quadrate form.

PROCEEDINGS OF THE ENTOMOLOGICAL CLUB OF THE
AMERICAN ASSOCIATION FOR THE ADVANCEMENT
OF SCIENCE.

Room 56, Maxwell House, Nashville, Tenn., Aug. 31, 1877.

Mr. Grote was called to the chair and congratulated the meeting that there were found members from the South interested in the science of Entomology, and regretted the absence of the President of the Club and other officers. A letter was read from President LeConte as follows :

Philadelphia, Aug. 24th, 1877.

Secretary of the Entom. Club Am. Assoc. Adv. Sci., Nashville, Tenn. :

DEAR SIR,—I beg that you will express to the Entomological Club of the Association my great regret that I am not able to attend the meeting at Nashville. It was my intention to be present, but I find now at the last moment that it will be extremely inconvenient for me to leave this city. I greatly wished to take part in the discussion on nomenclature, but I have already expressed myself so strongly as against such changes as are produced by the rehabilitation of forgotten or disused names, that I think my opinions are fully understood by my colleagues

Very truly yours,

JOHN L. LECONTE.

The Secretary's report of last year's meeting was received and adopted.

The chair drew the attention of the Club to the report of Capt. Dall on the subject of Zoological Nomenclature made at this meeting, and deprecated any separate action on the part of the Club.

The following resolutions were then passed :

Resolved—That since the Association has under consideration the subject of Nomenclature, the present Committee of the Club on that subject, consisting of LeConte, Riley, Saunders, Scudder and Grote, be continued to report at next meeting.

Resolved—That a request be made on the part of the Club to the Standing Committee of the Association, that copies of Capt. Dall's report on Zoological Nomenclature be printed and distributed to all active members of the Club before the issuance of the Nashville volume, so that the matter may be duly considered before the next meeting of the Club.

The meeting then entered into an election for officers for the next meeting, with the following result :

President : James A. Lintner, of Albany, N. Y.

Vice-President : Wm. Saunders, of London, Ontario.

Secretary : B. Pickman Mann, of Cambridge, Mass.

Mr. Grote exhibited specimens in all stages of the new Pine Moth, *Nephoteryx Zimmermani*. He referred to Mr. Meehan's remarks after the reading of the paper before the Association on Thursday last, that this was probably the insect so destructive to the Scotch Pine about Philadelphia.

Prof. Nicholson stated that he thought from Mr. Grote's description and specimens that this insect was the one noticed as attacking the Scotch Pine near Knoxville. The trees had been imported from the north.

Mr. Grote alluded to the migratory habits of the Cotton Worm, and stated that in his original paper (Hartford meeting) he had shown that the moth hibernated, but died before it could find cotton on which it could oviposit the ensuing year. Where the moth state was not reached the chrysalis perished in cold winters over the cotton belt. The broods were irregular, occurring in the same locality some years as early as June, some years as late as September.

Prof. Stubbs stated that in the main Mr. Grote's theory of a progression from south to north was, he was satisfied, correct. At the same time he called attention to occasions where the moth appeared in small areas, and thought it possible that in some cases the insect might succeed in holding over.

Mr. Grote stated that he thought that in localities where the circumstances were favorable, Southern Florida and along the coast of Georgia, that this might occur. He had in his original paper alluded to this, and he thought it more likely that the irregular patches on the cotton belt were partial colonizations from the southward or from the sea coast of Florida and Georgia. The first brood was more irregular in distribution. He further said that Prof. Tutwiler, of Ala., had told him that the observations made in his locality were to the effect that a south wind brought the worm ; in the present year the prevailing winds were from the north and they had been free from the worm in Northern Alabama. Mr. Grote concluded by urging the creation of a scientific commission to look into

the facts of the case. It was one that was the most important to the agricultural interests of the South.

Prof. Nicholson stated that he had observed a few specimens of the Colorado Beetle near Knoxville; the seed had been brought from the north.

Judge Bell stated that this year he had seen the Potato Beetle at Exeter, New Hampshire.

Mr. Grote exhibited some rare Coleoptera collected at Buffalo, N. Y., by Mr. Ottomar Reinecke. Adjourned.

(Signed) A. G. WETHERBY, Sec'y *pro. tem.*

NOTES ON SOME SPECIES OF HOMOPTERA.

BY THOS. E. BEAN, GALENA, ILLINOIS.

The suggestion of Mr. Hill (quoted on p. 89) that *Homopteras* "*edusa* and *lunata* are possibly sexes of one species," has reminded me of my own doubts regarding not only *edusa* and *lunata*, but also *Saundersii*, and caused me to make a careful examination of my material.

My entire stock numbers 83 local specimens, arranged after authentic types in three series, consisting of 42 "*lunata*," 24 "*Saundersii*," and 17 "*edusa*."

The specimens separated as *lunata* show no white lines or areas on upper side of wings.

The *Saundersii* have two large ovate or crescent areas on outer edge of primaries, and one similar but still larger crescent on outer edge of secondaries; these areas are partly outlined with white or greenish-white, especially on the inner side. There are also white or greenish-white ill-defined bands across fore wings at region of anterior transverse line.

The *edusæ* are like the last in appearance in all respects, except that the six marginal lunates are filled out with white, or pearl, or greenish-white.

After repeated observation and comparison of these 83 specimens, I feel no particular hesitation in declaring that the 42 *lunata* are all females, the 24 *Saundersii* and the 17 *edusa* all males.

Examination of the three series above mentioned appears to make evident the following results :

First—That the specimens do *easily* distribute into said three sets.

Second—That in general appearance the *Saundersii* and *edusa* series would be almost or quite indistinguishable but for the fullness of white on margin spaces of latter form, which constitutes so conspicuous a distinction.

Third—From the other two series that of *lunata* not only differs in lacking the white decoration, but is also different in the tone, the hue and depth of the diffused shades of color on the wings ; so that *lunata* differs from the other two markedly more than those differ from each other.

Fourth—Aside from mere color and shading, the definite markings are *alike in the three series*. Upon the basis of the characteristic lines alone, tone not taken into account, it would be safe to say that if there are two or more species within the limits of the entire set of specimens, then the same two or more species can also be found in *each* of the three series as above arranged ; that is, there is as much *essential variation* in either series as between any two series, or very nearly as much.

Fifth—By superior robustness of body, and especially greater fullness of abdomen at post-median region, as also in regard to antennæ, the specimens in *lunata* series differ strikingly from those of the *Saundersii* and *edusa* series. From these characters, with the difference of tone and absence of white clouding, I conclude that *there is a valid distinction of the lunata set from the other two*.

This distinction of *lunata* from the others must be either of species or of sex. As the *Saundersii* and *edusa* series differ unimportantly, by presence of a little white or much white, a distinction which alone is not valid either for a difference of species or sex, and as *these seem to be males* ; as, furthermore, the *lunata* do validly differ from the others for species or else for sex, and *these seem to be females* ; and as, finally, the three sets are alike in the definite lines important as criteria of specific difference—I therefore conclude *Saundersii* and *edusa* two male forms, and *lunata* the female form of one and the same species.

DETAILS OF COMPARISON.

Among the lunatae there is only moderate variation, consisting chiefly in less or greater development of the brown suffusion and the blue-black shades; in about seven specimens the dark shading is largely obsolete and replaced by light brown in an area on f. w. from t. a. line to t. p. line and beyond, extending partly to outer margin, but not reaching costa. There is an appreciable though slight variation as to curves and dentations of t. p. line.

The Saundersii present moderate variation as to amount of the white decoration, and in several specimens this is almost replaced by greenish white. There is some variation in tone of coloring, in degrees from medium brown to dark, somewhat purplish brown. One or two show on f. w. a somewhat yellowish light-brown area between t. a. and t. p. lines, not reaching costa. A little variation in t. p. line.

The edusæ vary slightly as to fullness of the white ovals or crescents on margins. Also as to color of same; some have crescents entirely white, others have them greenish but outlined with clear white. On f. w. of two examples area from t. a. to t. p. line is colored nearly uniform yellow-brown, the dark shades almost obsolete. Regarding variation in tone of coloring, the comment on *Saundersii* applies equally to this set.

EDUSA AND SAUNDERSII COMPARED.

Closely alike in size; if any difference, the latter average slightly larger.

Coloration, except as to degree of white, furnishes no means of separation.

In *Saundersii* the marginal crescents are merely sketched or outlined with white, pearl, or greenish-gray; in *edusa* the crescents are filled out with an amplitude of white, &c., some specimens showing greenish-white crescents outlined with clearer white. *Saundersii* looks like an unfinished *edusa*.

In observing the white decoration, at first the division of the two sets seems complete, but closer search discovers one *edusa* from whose marginal crescents the white is about half obsolete, and among the *Saundersii* are two whose crescents are so largely powdered with white that the step between these two and the cited *edusa* is no wider than the interval

between these two and the other *Saundersii*. Still, aside from these three, the specimens in either set are greatly uniform among themselves and the contrast is great between the two sets *as to this feature of decoration with white*.

I am unable to find other severance than by this white decoration ; indeed, the two series are in other respects such counterparts that if the sex characters permitted, I should conclude *edusa* the male and *Saundersii* the female. But very evidently such is not the case, for both series seem to contain males only.

LUNATA COMPARED WITH THE OTHERS.

Individuals more robust in body than those of the two other series, but as to expanse of wings about the same average.

Of the 42 specimens almost all have the general appearance of females. Of only one or two would there seem any doubt, and even these do not look like males, but their appearance is less conclusive as to their sex. In the other sets the reverse seems the case ; all but two or three decidedly appear to be males, and the exceptions do not look like females, but merely have less definite characters.

In color *lunata* contrasts with the others by a more sombre style of decoration.

On under side the markings of the three series agree as to essentials, the difference being in shading, &c. *Edusa* and *Saundersii* are alike, with a moderate range of individual variation. *Lunata* has on an average more distinct markings, varying to partial obsolescence of the strong lines.

The three forms occur coincidentally, the season of chief abundance, as indicated by the dates of my specimens, being from mid-July to about 10th August. A few bright ones show dates during September, others late in October, and one *lunata* November 12th. Of the late flight, part survive winter and are found in June (May more rarely) much worn. No *evident* fresh examples dated earlier than July 15th.

P. S.—On p. 136 see Mr. Grote's correction of p. 89.

A few *lunata* and *Saundersii* taken during the past two weeks (August 11th) tend to confirm the foregoing comments.

CORRESPONDENCE.

BUTTERFLIES ON MARTHAS VINEYARD.

DEAR SIR,—

I have spent the last ten days on this island, at Oak Bluffs, and made several excursions into the back country for a distance of about three miles. I find *C. phleas* the commonest butterfly, seen everywhere, in the town, fields and on the beach. Next to that *Argynnis idalia*, which abounds in old fields, and is just now fresh from chrysalis. Of *P. tharos* I have taken two fresh males, var. *marcia*. *Satyrus alope* male is making its appearance and the species may become quite common. I am not sure that some examples of *nephele* have not been seen also. Another *Satyrus* I saw in the oak woods, but could not determine whether it was *eurytris* or *canthus*. *Philodice* seems rare, and I have seen one example of *antiopa* and one of *atalanta*. No *Hesperians* at all have been seen, and no other butterfly than I have above mentioned. On a ride to Boston I saw a *Teris nicippe* flying near Brockton Station.

W. H. EDWARDS.

July 29th, 1877.

DEAR SIR,—

Perhaps some of the readers of your valuable paper might be interested in knowing of the capture at this place of another superb *Catocala marmorata* Ed., which I took July 2nd. It was sitting on the trunk of a Silver Poplar tree, within a few yards of where I captured one on July 10th, last season. Prof. Wetherby and myself have each taken a single specimen of *Catocala agrippina* Strecker, whose types were from Texas, I believe.

CHARLES DURY.

Avondale, Ham. Co., Ohio, Aug. 15th, 1877.

DEAR SIR,—

On p. 120, vol. ix., CAN. ENT., is published a note by Mr. Robert Bunker, referring to the "effect of hot weather upon certain Sphinges," particularly *P. satellitia*.

I have regularly for several years past taken mature larvæ of *P. achemon* previous to July 10th, the transformation of which, so far as I know, was

completed by Sept. 25th of the same year. This year, although everything is about two weeks behind its usual time, I received two mature larvæ July 5th, both of which had unfortunately been killed; with them came a moth taken the same day, whose wings had not expanded when discovered.

The time from deposit of egg to pupation is about eight weeks, sometimes a day or two more, but usually three or four days less, hence these ova must have been deposited before May 10th, or before even *Colias philodice* had appeared. As I know of no Sphinges emerging here before the middle of June, the contraction of the time of growth would be very remarkable in this case, even had the weather been hot, which it has not.

I have taken this moth (*P. achemon*) in May, flying about the early spring flowers in company with *Deilephila lineata*, both very ragged and much faded; this would seem to suggest that *P. achemon* (and perhaps other Sphinges) exists as it were in duplicate, the September examples hibernating in the perfect state and depositing ova in the spring. A state of affairs possibly instituted by a long, dry and warm season in summer and autumn, and continuing until a severe winter, destroys the hibernating examples, which must also suffer greatly from mice, and their ova and larvæ from late frosts, thus accounting for their rarity.

This is, I admit, a very weakly supported hypothesis, resting entirely upon circumstantial evidence, as early examples of strong moths like Sphinges *might* travel many miles before a strong south wind; if, however, some collector who has females emerge in September, would dissect them and ascertain how far the ova are developed, the result would probably offer a satisfactory solution as to the probability of occasional or regular hibernations.

It may be a matter of interest that *Pieris rapæ* has reached this point in its westward journey. I took one ♂ example at Maplewood, immediately west of this city, Sept. 8th; seemed to be more abundant than *P. protodice*, which was flying in the same locality.

C. E. WORTHINGTON, Chicago.

DRYOCAMPA RUBICUNDA (FABR.)

DEAR SIR,—

Mr. Linter, in his "Entomological Contributions," No. 3, has a very elaborate description of this larva, noting, indeed, very minute char-

acters and some which are by no means constant, such as the number of spinules on different portions of the body. There are some few words to which exception may be taken; for instance, the color is not always "apple green," being not unfrequently greenish-white, and in such case the lateral stripes are nearly black.

But, speaking generally, the description is very accurate; one important omission has, however, occurred, and it is to this omission I wish to draw attention. I have, from time to time, reared hundreds of these larvæ, and I never saw one that had not a *conspicuous red patch*, with white granulations, on the stigmal portions of segments 11 and 12. That so careful an observer as Mr. Lintner should have overlooked this mark, had it been present in the specimens he examined, seems improbable; and now the question arises—Has not Mr. Lintner described some species not *rubicunda*?

I urged this consideration on Mr. Lintner some two years since, and sent him a small batch of larvæ for his examination. I think he told me that they all died, and, so far as I know, he has taken no further notice of the matter.

I have an indistinct recollection that some one has recently described a new species of *Dryocampa* allied to *rubicunda*, but do not feel quite sure; but, any way, the questions are important—Did Mr. Lintner describe *D. rubicunda* larva inaccurately? or, Did he describe the larva of a new species? or, Do the larvæ of *rubicunda* vary to the extent of sometimes losing the red patch?

W. V. ANDREWS, Brooklyn, N. Y.

FOOD PLANTS OF SATURNIA IO.

DEAR SIR,—

The larvæ of this species are unusually abundant here this season, and I have taken them feeding on White Birch, Oak, Corn, Willow, Sweet Fern (*Comptonia asplenifolia*), Currant, Apple, Wild Indigo (*Baptisia tinctoria*), Clover, Bush Clover (*Lespedeza*), Snow Berry (*Symphoricarpos*), and the Ash.

L. W. GOODELL.

Amherst, Mass., Sept. 1st, 1877.

The Canadian Entomologist.

VOL. IX.

LONDON, ONT., OCTOBER, 1877.

No. 10

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The seventh annual meeting of the Entomological Society of Ontario was held in London, at the rooms of the Society, on Wednesday evening, September 26th,

The President, W. Saunders, in the chair.

A considerable number of members from various parts of the Province were present; also a fair representation of those resident in the city.

After calling the meeting to order, the President expressed his regret that the Society had during the year lost the valued services of one of its officers. Owing to pressing business engagements, the Secretary-Treasurer, Mr. J. H. McMechan, had found it necessary to resign. Pending the appointment of a successor, Mr. J. Williams had kindly consented to act as Secretary-Treasurer *pro tem.*, and in this capacity had rendered most valuable and timely assistance.

The report of the Treasurer showed a very satisfactory state of the finances, there being a balance to the credit of the Society at the close of the financial year of two hundred and thirty-six dollars.

REPORT OF THE COUNCIL, 1877.

In presenting the seventh annual report, the Council feel highly gratified at the success that has attended the labors of the Society during the past year.

We are happy to note the return of the Society's Centennial collection of insects, which reached London in good condition shortly after the close of the International Exhibition. This collection, which was noticed in your last annual report, is now placed in the Rooms, where it will in future be available for reference. As this beautiful collection was made

up largely from the cabinets of individual members of the Society, who generously loaned the insects for the purpose of exhibition, it was thought that if the immediate return of the loaned specimens was insisted on, the value of the series would be greatly impaired; but we are happy to state that the parties concerned have in most cases given their consent to allow the specimens to remain on deposit in the Society's Rooms; so that we still retain the Centennial Collection of Canadian Insects almost intact, a monument to the zeal and industry of those members of the Society who were actively engaged in this work.

We may add that this collection was placed on exhibition at the Rooms on several occasions after its return, when some of the members were present to assist visitors, and from the interest manifested then by the public in the matter, we would recommend that the Rooms be thrown open occasionally to all who may desire to visit them, and that public notice be given of the same.

The CANADIAN ENTOMOLOGIST has almost completed its ninth volume, and fully maintains its reputation as a record of the latest investigations and discoveries in scientific and practical Entomology. We would return our heartiest thanks to all those who have so kindly contributed to the pages of the ENTOMOLOGIST, and request that they will continue to favor the Editor with the results of their observations and experiments. Although we have reason to feel gratified at the efforts of the Society to excite in the general public an interest in Entomology, yet we would respectfully suggest that our successors may be able in some measure to improve on the means adopted in the past to render the ENTOMOLOGIST even more useful to beginners in this interesting science, either by more frequent descriptions and illustrations of our common insects, and perhaps by referring to the insects that are likely to appear in each month of the summer, and the manner of their capture and preservation, or in any other method that may appear suitable.

We are happy to note a steady increase in the number of members. The Branch Societies, especially in London and Montreal, are progressing favorably.

The funds of the Society are in a gratifying state; by economical management we have been enabled to sustain and successfully carry out all the operations we have undertaken; for details we refer to the report of the Secretary-Treasurer.

The Library has been enriched by a number of valuable scientific works, and others of more general interest, but which bear on Entomological subjects. Among the additions we may mention the *Encyclopedia Britannica*, as far as at present published, which will prove invaluable as a means of reference. Our stock of engravings and electrotypes has been slightly increased, but in this line we are greatly restricted by want of means, and are obliged generally to content ourselves with electrotypes of other illustrations. We believe that a much larger sum than is annually given for this purpose might be profitably expended in procuring original illustrations.

Submitted on behalf of the Council by

JOSEPH WILLIAMS, Secretary-Treasurer.

The President then proceeded to deliver his annual address.

ANNUAL ADDRESS OF PRESIDENT.

GENTLEMEN,—At the close of another year it is my duty and privilege to offer you a few remarks relating to our progress as a Society, and also to the general advancement of that department of natural science in which we all feel so deep an interest.

The progress of the Entomological Society of Ontario during the past year has been steady and continuous. Every season witnesses an infusion of new blood into our ranks, mainly from among the young, who, when entering on the pursuit of this charming study, bring with them all the enthusiasm and ardor of youth. Our membership is thus gradually increasing, and our influence and sphere of usefulness yearly extending. The importance of the study of Entomology is gradually becoming more deeply impressed upon the public mind. The Entomologist needs no longer to apologize for the trivial character of his pursuits, for small and apparently insignificant as the operations of the individual destructive insect may appear, yet when multiplied, as they usually are, by millions, their work is so disastrous and so desolating that the study of their life history, with the view of combatting more effectually their enormous increase, becomes of the most vital importance.

We have to note the prevalence during the past year of several insect pests. Early in June our gardens, orchards, and even our forests in the western portion of Ontario were frightfully devastated with the Forest

Tent Caterpillar, *Clisiocampa sylvatica*. There were millions upon millions of them, and so enormous were their numbers, and so persistent their attacks, that after fighting them bravely for a week or two, many gave up the contest in despair, weary of the slaughter. Many an orchard was rendered bare and leafless, and in some instances the woods were so void of foliage as to remind one of winter. This was particularly the case about London, and our orchards and gardens here were saved from destruction only by the most persistent effort. For several weeks caterpillars were swarming everywhere, so that the timid scarcely dared venture out under the shade of trees for fear of bringing them home on their clothing or persons. By the end of June they had nearly all become chrysalids, and it was interesting to observe the strange looking deformities they occasioned among ornamental shrubs and flowers by twisting the leaves into suitable forms in which to enclose their cocoons. On the trees the few fragments of leaves remaining were put to a similar purpose, and thus sewed up and hanging pendant with the weight of sometimes two or three cocoons huddled together, they looked very odd.

On examining a number of these chrysalids, a large proportion of them were found to be infested with parasites, which materially lessens the chances of their being so very numerous again next year; still we fear that enough of them passed safely through all their preparatory stages to give us some trouble another season.

The Cabbage Butterfly, *Pieris rapæ*, is still progressing westward. This year it has extended its domain as far as Chicago, where a few of the advance guard have been captured. In the neighborhood of London their larvæ have been very destructive this summer, so disfiguring and destroying the cabbages in many instances as to render them entirely worthless. The history of the introduction of this pretty little pest forms an interesting chapter in our Entomological annals. During the time of the Trent difficulty in 1861 a quantity of fresh vegetables were sent along with other stores to Quebec for the sustenance of the gallant little army which was despatched to our shores. As the Cabbage Butterfly is said to have made its appearance shortly after this period, it is presumed that it was accidentally introduced with the stores for the troops. In 1863 specimens were sent to us from this district for determination, which was the first intimation we had of their existence in this country. By 1866 the butterfly had spread further west than Montreal, and east as far as the Saguenay River. In 1869 it was reported as common in New Jersey, and

by 1871 it had travelled east as far as Halifax, Nova Scotia, and west to the middle of the State of New York. It now embraces an area bounded by the shores of the Atlantic from the River St. Lawrence to Virginia, and has overrun the whole country westward as far as Chicago. A few days since, while on a visit to the Muskoka District, I was surprised to find them plentiful, in company with the Colorado Potato Beetle, as far north as the head of Lake Rosseau.

The wonderful manner in which this insect has adapted itself to the varying climatic characteristics embraced within this wide area, is a matter of astonishment. It seems to thrive alike in the cold north and sunny south, and in every place where it establishes itself it has multiplied so rapidly as to become in a very short time the commonest of all butterflies. The little parasite, *Pteromalus puparum*, which has also fortunately been introduced from Europe, and which is finally destined to keep this pest within reasonable bounds, is on the increase here, but is not yet sufficiently numerous to fulfil its mission as successfully as we could wish.

The Colorado Potato Beetle, as predicted, has at last found its way across the Atlantic, and founded colonies on the Continent and in the British Isles. Their arrival and settlement has caused a commotion almost as great as would the approach of a hostile army. According to newspaper accounts, large patches of ground where the enemy has been seen lurking have been saturated with benzine and fired, while in the search the whole surface has been turned over with the spade and shovel as carefully as if each specimen were a nugget of gold or a diamond. Cargoes of all sorts in which it was suspected the intruders could find a hiding place have been submitted to the most rigid examination by government officials, and various edicts were promulgated, with a view to strangle this evil in its infancy; but the beetle is heedless of enactments, however prohibitory, and we fear that no vigilance, no matter how persistent, will avail in preventing the spread of this little intruder, and that before long the potato grower in Europe will be obliged to regularly adopt measures for poisoning this pest similar to those so successfully carried out by our own people.

Since I was last privileged to address you the Congress of the United States, in view of the enormous losses yearly inflicted on agriculture by destructive insects, have appointed an Entomological Commission composed of eminent Entomologists, who shall devote their whole time for several years to a study of the habits of the various insect pests and the

thorough testing of the efficiency of such remedies as have been or may be devised for their destruction, and to report progress from time to time. A liberal appropriation to defray the expense of this work has been made, and the laborers are now actively engaged in the field.

Early in the year your President was requested by the Chief of this Commission, Prof. C. V. Riley, to bring this important matter before our Government and ask their influence towards furthering the objects in view. Accordingly, at a meeting of the Council of Agriculture, held in June last, the writer introduced a resolution urging the co-operation of our Government with that of the United States in this undertaking, which was unanimously adopted by the Board and transmitted to the proper authorities. I am pleased to be able to state that the Minister of Agriculture, in his reply, assured us that this subject had already engaged their serious attention, and that every effort would be made to aid the Commission in its work. This season is being spent by these savans in especially studying the habits and breeding places of the destructive Locust of the West, and already they have made extended observations, not only in the western territories of the United States, but also in some of the adjoining portions of our Dominion.

The Entomological Club of the American Association for the Advancement of Science held its annual meeting in Nashville, Tenn., commencing on the 30th of August, when many interesting subjects were discussed. An important paper was read by A. R. Grote, Esq., of Buffalo, N. Y., on a new insect destructive to the red and white pine trees, the sources of our valuable lumber trade. From the details given of the work of this insect we fear it may prove a formidable foe to the future growth of our pine forests. Our Society has usually been represented at these annual gatherings, but on this occasion, owing to other pressing and unavoidable engagements, those of us who have usually attended were prevented from being present.

We cannot better illustrate the recent progress made in Entomological science than by referring to one department, namely, that of the study of our night-flying moths. This has been greatly stimulated by the general practice of sugaring, by which immense numbers of these insects have been attracted, and their capture in good condition made an easy matter. This practice in America was but little followed until 1874, when an English Entomologist, Mr. George Norman, visited Canada, and, after having faithfully carried on the process of sugaring for a season, he pub-

lished the results of his labors and his mode of operating in our journal. His success was so unprecedented, and so many rare or hitherto unknown species captured, that collectors everywhere were induced to imitate his example, and in the short time that has since elapsed an immense number has been added to the list of known species, and our collections have been enriched by this means with an extensive series of hitherto rare specimens.

Our monthly journal, the CANADIAN ENTOMOLOGIST, is still well sustained, its pages being regularly filled with interesting and original contributions. Did time permit, I might have occupied your attention at considerable length by referring to the many valuable points brought out in these papers. I cannot, however, refrain from adverting to the contributions of Mr. W. H. Edwards, of West Virginia, on the life history of some of our butterflies, in which it has been shown that not a few of our so-called species are merely dimorphic forms of other species, and attention drawn to the important influence of cold in modifying these forms. By exposing the chrysalids to the influence of this agency by laying them for varying periods on ice, or placing them in an ice house, some of these dimorphic forms have been produced at will, thus throwing much light on the causes of variation in species.

I would also call your attention to the many recent valuable additions to Entomological literature in America, especially to the beautifully illustrated work of Dr. A. S. Packard on the Geometrids of North America ; to the continuation of Edwards' magnificent work on North American Butterflies ; to the learned and elaborate treatise on the Ryncophora of America north of Mexico, by Drs. LeConte and Horn ; to the excellent works of Prof. Townend Glover, of Washington, on American Diptera, Orthoptera and Hemiptera ; to the valuable reports of the State Entomologist of Missouri, and many other excellent works. But I must not trespass longer on your patience. Thanking you for your kind partiality in honoring me as you have done, I have the honor to be

Yours very sincerely,

WM. SAUNDERS.

London, Ontario, September 25th, 1877.

The election of officers then took place, with the following results :

President : W. Saunders, London.

Vice-President : E. Baynes Reed, London.

Secretary-Treasurer : J. Williams, London.

Council : Wm. Couper, Montreal ; Rev. C. J. S. Bethune, Port Hope ; J. Pettit, Grimsby ; J. M. Denton, London ; Rev. R. Burnet, London ; R. V. Rogers, Kingston ; Jas. Fletcher, Ottawa.

Editor of CANADIAN ENTOMOLOGIST : W. Saunders, London.

Editing Committee : Rev. C. J. S. Bethune, Port Hope ; E. B. Reed, London, and G. J. Bowles, Montreal.

Library Committee : The President, Vice-President, Sec'y-Treasurer and J. M. Denton.

Auditors : Chas. Chapman and A. Puddicombe, of London.

During the time allotted for miscellaneous business, Mr. D. W. Beadle, of St. Catharines, spoke of the ravages of the Cabbage Butterfly, *Pieris rapæ*, and of the great benefit that would be conferred on gardeners by the discovery of some remedy which might be safely used for this pest. He also referred at length to the great success which had attended the labors of the Entomological Society, and of the high reputation it had acquired in America and foreign countries.

Mr. P. C. Dempsey, of Alboro, stated that hot water had been successfully used in his neighborhood to destroy the *Pieris* larva ; that experiment had shown that the cabbage would bear the application of water heated to 200° Fahrenheit, without injury, while water at a somewhat lower temperature than this would effectually destroy the larva. The hot water may be applied through a rose sprinkler or by the use of a dipper. He also stated that a cold infusion of Quassia in the proportion of two or three pounds to a barrel of water had been found effectual in destroying the worm, and more convenient in its application than hot water. This solution may give a slightly bitter taste to the vegetable unless thoroughly washed, but it is perfectly harmless to the human system.

Mr. Chas. Arnold, of Paris, referred to the increasing ravages of the Codling Worm (*Carpocapsa pomonella*), and stated that he had scarcely a sound apple in his orchard this year. This was doubtless partially due to the small crop, and he hoped that the scarcity of apples this season would so far starve out this insect that we might enjoy some immunity from its attacks for a year or two.

Rev. Dr. Burnet, President of the Fruit Growers' Association, expressed his pleasure at being present, and his high appreciation of the labors of the active members of the Society, and referred to the great benefits which

fruit growers had derived from the publication of the results of their investigations on noxious insects injurious to fruits.

Prof. Buckland, of the Department of Agriculture, Toronto, spoke of the great utility of the work carried on by the Society in diffusing information in reference to the various insect pests which afflict the farmer and fruit grower, and of the flattering notices he had seen in foreign journals concerning the CANADIAN ENTOMOLOGIST. He believed the Society well deserved the cordial support of all those interested in agriculture.

DESCRIPTIONS OF NEW SPECIES OF BUTTERFLIES BELONGING TO THE N. AMERICAN FAUNA.

BY W. H. EDWARDS, COALBURGH, W. VA.

Melitaea ulrica.

Male—Expands .85 inch.

Upper side black, marked and spotted with deep red fulvous, much as in *P. vesta*; both wings have a submarginal series of small crescents, the one on middle of primaries considerably larger than any other; on primaries this series is preceded by a sinuous row of small spots, and next by a bent row of larger ones; a fourth row curves round the end of the cell, and there are some spots in and below cell. Secondaries have two rows of irregular small spots across the extra discal area, and across the disk a broad band; some spots in cell and on basal area; fringes fuscous alternating with white.

Under side of primaries black over the outer fourth; next the margin a narrow band made up of confluent fulvous spots, and immediately beyond this is a series of small white spots, corresponding with the submarginal series on upper side, the middle one long, lanceolate, and a similar one at apex, but somewhat smaller; the second row of upper side is repeated, but beyond this to base the ground is mostly fulvous, representing the spots of upper side, but now enlarged and mostly confluent; secondaries have a marginal band like that of primaries, followed by a complete series of large white spots, crenated, or the middle ones almost

lanceolate ; above these the area is black, and in this is a row of small rounded fulvous spots stopping a little before the costal margin ; across the disk a row of white points and a continuous white band ; beyond to base fulvous on black ground, but with a white spot in cell, and a band near base, and one directly at base.

Body above black, with fulvous hairs ; beneath cinereous ; legs cinereous, fulvous in front ; palpi yellow-fulvous in front, white at base ; antennæ black annulated with white ; club black, fulvous at tip.

Female—Expands .9 inch. Scarcely differs except that the fulvous is paler.

From 4 ♂, 2 ♀, taken by Mr. Z. Boll, at San Antonio, Texas. On the under side this small species much resembles *Mel. Gabbii* in general appearance ; the wings are narrow, and primaries much produced. It belongs to Group II of my Catalogue.

Melitaea dymas.

Male—Expands .95 inch.

Upper side brownish-black, marked and spotted with orange-fulvous ; primaries have a submarginal row of rounded spots, obsolete on apical half ; both wings crossed on the extra discal areas by a common band of separated spots, mostly sub-quadrate, bent opposite the cell of each wing and almost at a right angle on secondaries ; primaries have five spots on cell, filling it, except as they are separated by black lines ; and several small spots at end of and below cell ; secondaries have the basal area nearly all fulvous, leaving a broad belt of black between this area and the extra discal band ; in the cell a subovate black spot with fulvous stripe in middle ; on the black belt in the several interspaces are a few fulvous scales ; fringes of primaries fuscous, with a little white at intervals, and the apex wholly white ; of secondaries fuscous only.

Under side of primaries has the margin bordered by a confluent band of crenated spots, and before this is a row of narrow dull white lunate spots, or in part lanceolate, stopping at second branch of median ; these stand upon a narrow black belt ; beyond to base the ground is orange fulvous, with four transverse black lines in cell, a curved row of rounded black spots outside cell, and an indistinct black line across the disk. Secondaries have the marginal series dull white on black ground, and next preceding an orange-fulvous band, and then a broad dull white band cut

beyond the middle by a black stripe from outer to inner margin; the basal area, including the cell, orange, except a triangular white spot in cell, edged with black, and a white transverse band similarly edged; along the inner margin this band is joined to the discal white band.

Body above color of wings, beneath gray-white and black; legs black and white, fulvous in front; palpi fulvous with black hairs, white at base; antennæ fuscous annulated with white; club black.

Female—Expands .95 to 1 inch.

Upper side uniform yellow-fulvous; a white patch on edge of costa of primaries two-thirds the distance from base is limited by the subcostal; hind margins of both wings edged with black, broadest at apex of primaries and along the middle of secondaries; on this rests a common series of spots, color of the ground, mostly crenated, and bordered above by a crenated black stripe; the disks are crossed by two black stripes, the outermost on primaries being nearly parallel to hind margin and not distinct, the other bent round end of cell; on secondaries these are obsolete; in cell of primaries four transverse, rather wavy lines, and a slight mark near base; two similar lines below cell; secondaries have in and below cell very similar lines, but more or less obsolete.

Under side nearly as in male, the only difference being in the paleness of the ground and the obsolescence of the black markings on primaries.

From 1 ♂, 3 ♀, also sent me by Mr. Boll, and taken at San Antonio, Texas. I sent one example of each of these species to Mr. A. G. Butler, British Museum, to ask if they had been described as Mexican. Mr. Butler regards them as hitherto undescribed. The wings of *dymas* are narrow, primaries much produced. There is a remarkable difference between the sexes on upper side, but below the markings are almost identical. It is the opinion of Mr. Boll that these constitute but one species. This species belongs to Group III of my Catalogue.

Amblyscirtes nysa.

Female—Expands 1.1 inch.

Upper side glossy dark brown; primaries have three small transparent spots forming a curve, on costal margin, at three-fourths the distance from base, and a point on the disk; fringes long, fuscous next the margins, but anterior mixed with white.

Under side of primaries a little paler, the spots repeated, the discal spot more distinct; secondaries brown clouded with blackish, a dark illy-defined band following the hind margin, a patch on disk and another on costal margin; also dark at base; some gray scales forming patches border the darker portions near outer angle, and there are others on the median interspaces. Body dark brown; below, thorax yellow-white and cinereous, the abdomen gray-brown; palpi yellow-white; antennæ fuscous above, annulated with gray-white, gray-white below; club black. From two examples, sent me by Mr. Boll, the other by Mr. Belfrage, and taken in Texas.

Pholisora nessus.

Male—Expands 1.1 inch.

Upper side light brown; a black band crosses the extra discal area of both wings, formed by short longitudinal stripes, one on each interspace; and a narrower band, more confluent, crosses the disk of primaries and basal area of secondaries; along the hind margins is a dash of gray in each interspace, not distinct; primaries have three transparent spots on costal margin at end of the fold, and three others half way beyond to apex; and on middle of disk are two marks forming a V-shaped spot, not quite joined at the angle; secondaries have a similar small spot near outer angle and two on the disk; fringes long, fuscous, with a few gray hairs.

Under side lighter brown, clouded much as above; the spots repeated. Body dark brown; palpi white; antennæ fuscous annulated with gray white; club black.

Female—Expands 1 inch.

Similarly marked, the colors lighter, especially on under side.

From 2 ♂, 1 ♀, received from Mr. Boll, taken at San Antonio, Texas. Mr. Meske also has this species from Bastrop, Texas.

ON THE BLACK-WING GROUP OF THE GENUS CATOCALA.

BY LEON F. HARVEY, M. D., BUFFALO, N. Y.

The "species" of the black-winged group (*Mormonia* of Hübner) comprised in the genus *Catocala* have been largely augmented as the

collections are increased throughout the country. Without doubt, when we shall be thoroughly conversant with the immature stages, our knowledge of the species will be more perfect. Our collections containing only the perfect stages, the forms are clearly recognizable. Mr. Grote has recently arranged the species of this group in the Collection of the Buffalo Society of Natural Sciences as follows, and a species named for the first time is contained therein. The following classification contains our North American species, one of which (*sappho*) is unknown to me.

Gen. *Catocala* Schrank.

Group I, *Mormonia* Hübner.

Sub-group I (fringe of secondaries white).

- | | |
|----------------------------------|----------------------------------|
| 1. <i>C. epione</i> Drury. | 8. <i>C. retecta</i> Grote. |
| 2. <i>C. lacrymosa</i> Guen. | 9. <i>C. flebilis</i> Grote. |
| 3. <i>C. sappho</i> Strecker. | 10. <i>C. ulalume</i> Strecker. |
| 4. <i>C. subviridis</i> Harvey. | 11. <i>C. Robinsonii</i> Grote. |
| 5. <i>C. agrippina</i> Strecker. | 12. <i>C. obscura</i> Strecker. |
| 6. <i>C. viduata</i> Guen. | 13. <i>C. simulatilis</i> Grote. |
| 7. <i>C. desperata</i> Guen. | |

Sub-group II (fringe of secondaries blackish).

- | | |
|---------------------------------|----------------------------------|
| 14. <i>C. Levettei</i> Grote. | 17. <i>C. insolabilis</i> Guen. |
| Syn. <i>C. judith</i> Strecker. | |
| 15. <i>C. Angusi</i> Grote. | 18. <i>C. tristis</i> W. H. Edw. |
| 16. <i>C. residua</i> Grote. | |

It would seem best to follow this arrangement of the species. In the second sub-group the apices of secondaries are not touched with white or scarcely so in *Levettei*. In *tristis* the white apical patch is quite evident.

C. subviridis, n. s.

♂. Allied to *agrippina*. Differing by the fore wings being shaded with dark silky green. Lines black, evident, accompanied by white scales, evident on internal margin. The brown shades of *agrippina* are wanting. Sub-reniform, detached, small; subterminal line white and rather evident. Beneath like *agrippina*, but the white bands are narrower.

Expanse $3\frac{3}{8}$ inch. Habitat, Dallas Co., Texas, Boll Coll. One specimen. Possibly figured as a var. of *agrippina* by Strecker.

C. residua, var.

♂. A remarkable aberration of this species is represented in the Collection by a specimen which has the left hind wing smaller and beneath hoary at base without the band. Fore wings with the t. p. line thrown out of position, back towards base of wing and aberrant in its course. Thorax rusty. Habitat, New York.

TINEINA.

BY V. T. CHAMBERS, COVINGTON, KY.

GRACILARIA.

G. fasciella Cham.*G. 5-notella* Cham.

With ten specimens of *fasciella* and two of *5-notella* before me, with scarcely a trace of variation in the ten, but with the two differing from each other somewhat and both differing very decidedly from the ten, I had no doubt as to the distinctness of the two species. A larger series, however, induces the belief that they belong to the same species. The difference between them may be thus stated: In *fasciella* the base and apex of the fore wings are brownish-gray, and between these portions are three brownish-gray and four white fasciæ, all very distinct and well defined. In *5-notella* the whole dorsal half of the wing is white, there is a small brown spot on the base of the costal margin, another further back, and still further back another which in the middle of the wing is produced backwards to the gray-brown apical part of the wing, which encloses two small white costal streaks. A larger series, however, shows that the two forms vary into each other and induce the suspicion that Dr. Clemens described his *G. fulgidella* from a form like *5-notella*. The tuft on the second joint of the palpi is minute, and in all of my specimens but two it has been removed in pinning.

G. Packardella Cham.

In this species there is great range in the intensity of the purplish tinge. Some specimens might be described as having it so strongly developed as to ally them to *purpuriella*, *stigmatella*, &c., while in others

it is very faint and delicate, the ground color of lemon yellow not being at all obscured by it. It is, however, allied to *superbifrontella* and *Severderella*, &c., more closely than to any other known species.

G. inornatella Cham.

This must be dropped from the list, as I am satisfied that it was described from worn specimens of *G. Packardella* and *superbifrontella*.

G. purpuriella Cham.

Since the last notice of this species was written I have bred it from larvæ feeding on the silver-leaf poplar ; but I have never met with it on the weeping willow, though it is common enough on many of our native willows. It may prove to be the European *G. stigmatella*, which feeds on sallows. It is certainly very near that species.

ANTISPILA.

A. ampelopsiella Cham.

In Vol. 6 I have given this name to a mine and larva found in leaves of *Ampelopsis quinquefolia*, the imago being then unknown. I have also *loc. cit.* described a species bred from grape leaves, without naming it, because I thought it probable that it would prove to be *ampelopsiella*. Since then I have bred it both from *Ampelopsis* and from wild grape leaves (*Vitis cordifolia*), and it proves to be the same species described in Vol. 6. The description, however, is imperfect, having been prepared from a single slightly worn specimen.

A. hydrangeazella Cham.

This species was also named from the larva and mine only. I have since bred it. It is a little larger than *ampelopsiella*, though scarcely so large as *isabella* or *viticordifoliella*, and is perhaps the prettiest species of the genus. The palpi and tips of the antennæ (last five joints), and the under side of a few of the basal joints snowy white. Head, thorax, abdomen, inner surface of legs, hind femora and tibial spurs of hind legs like burnished steel ; tarsi of anterior and middle legs and tips of hind tarsi yellowish white, posterior tibia on outer surface and tarsi, except the tips, purplish, with metallic reflections. Anterior wings and a spot on each side of the thorax bronzy brown, without greenish reflections ; ciliæ

purple, tipped with silvery gray. The fascia, costal and dorsal streaks and apical spot are brilliant silvery; the fascia is not constricted on the fold and the streaks are placed as in the other species; the costal spot is small and the dorsal large and almost an exact triangle, being, however, a little wider on the base and the margins very faintly concave. Hind wings and ciliæ pale purplish fuscous.

It thus differs from *ampelopsiella* in having the tips of the antennæ white and in other minute particulars. The case in which it pupates is elongate and narrow, a long ellipse; that of *ampelopsiella* is a short and wider ellipse, that of *viticordifoliella* is nearly oval, that of *isabella* a very wide oval, almost circular, and that of *cornifoliella* is smaller than that of *isabella*, though resembling it more in shape than that of *viticordifoliella*, which is nearer to it in size. That of *nyssæfoliella* I have not seen. It requires careful observation to distinguish the species. They are more readily distinguished by their cases than by the markings of the imago. *Hydrangeæella* and *ampelopsiella* may be distinguished at once from the others by the possession of the apical spot, but they require close observation to distinguish them from each other. So likewise do *isabella*, *nyssæfoliella*, *cornifoliella* and *viticordifoliella*. *Cornifoliella* and *isabella* are, however, of a duller, darker brown than the other two, and *viticordifoliella* likewise has white annulations towards the tips of the antennæ.

I have not seen any of the European species, but comparing our species with the figures of *Pfeifferella* and *Treitschkiella* in Nat. His. Tin., vii., the latter are much paler or lighter in color than our species.

NOTES ON NOCTUIDÆ.

BY A. R. GROTE,

Director of the Museum, Buffalo Society Natural Sciences.

Chytonix palliatricula.

This species has the thoracic vestiture mixed with hair-like scales, and it agrees in all respects with *C. iaspis* as to structure and pattern of ornamentation. It differs from *Bryophila lepidula* in these respects and in that the abdomen is more strongly tufted. I have taken all these species in June and July in the vicinity of Buffalo.

Hadena quaesita.

Prof. Lintner's remarks in letters on the variability of *lignicolor* and his doubt, after seeing my type, of the validity of *quaesita*, induced me to take a large number of specimens this season; and though I have not taken one exactly like *quaesita*, I have a series which approach it so closely that I think it now only a pronounced example of that form of *lignicolor* which has the ground color of primaries very pale. The reddish tint is decidedly absent and the dark shades on terminal space and elsewhere contrast more strongly. The slight differences in the lines and stigmata are, I am satisfied, only varietal. The name *quaesita* applies then to the dark brown and pale form of *lignicolor*.

Hadena delicata.

I have taken a few fresh specimens of this species near Buffalo in June and July. The deep green shading is very beautiful and distinct on the thorax, base of the wing and to the subterminal line. I have since referred *H. interna* to this species, the type exhibiting the principal features of *delicata*, especially the inferior sinus of the subterminal line, but showing no green shades whatever, though comparatively fresh.

Mamestra vicina.

I have taken several specimens of this species near Buffalo, in July. I cannot separate satisfactorily from this species certain Texan specimens which I suppose to be the *teligera* of Mr. Morrison. The ovipositor is extended in one Texan ♀, in another not visible. I do not see it externally in *vicina*. Its visibility does not seem to me a satisfactory generic character, and in the series of *grandis*, *subjuncta*, *atlantica*, *vicina*, I would include the Californian *Mamestra pensilis*, formerly referred by me to *Dianthoeia*, but apparently representing *vicina* in the western district.

Pallachira, n. g.

♂. Antennæ scaled on their upper surface with long setose pectinations outwardly; on the inside the processes are short, and from base to basal third much reduced; at this point the inner series is interrupted by a stouter claw-like process. Ocelli present; eyes naked; squamation scaly and thin. Legs slender, closely scaled, unarmed; hind tibiae with two pair of spurs. Fore feet long and with the terminal joints tufted. Body slender; wings ample; abdomen exceeding secondaries.

I refer this genus to the Deltoids near *Herminia*. My single specimen in good condition has the fore feet so tufted that I cannot make out satisfactorily the form of the tibiae and tarsi; they seem to be aborted.

Pallachira bivittata, n. s.

Entirely pale ochrey, powdered with fuscous. A broad fuscous stripe below median vein from base to external margin. A second shorter stripe from the extremity of the cell outwardly. Else the entire insect is concolorous. *Expanse* 25 mil. Buffalo, July, coll. auct. The fore wings recall in color those of *Arsilochia Henrici*.

Agrotis trabalis, n. s.

♀. Fore tibiae unarmed; middle and hind pair spinose. Eyes naked. Thorax with a small tuft behind the collar; behind with a divided tuftlet. Abdomen a little flattened, carinated, with a tuft on basal segment. Wings ample; form rather stout. Whitish gray with large stigmata and bright brown contrasting subterminal space. A basal black dash, a second above it on the cell, before the orbicular, which latter is near the t. a. line, inaugurated above it on costa by two black lines rather wide apart, with white included space. Below the t. a. line is twice waved to internal margin. Basal space whitish; basal line indicated. Sub-basal space dark gray. Stigmata concolorous, ringed with black, very large. Claviform incomplete; orbicular a little flattened, ovate; reniform moderately excavate. T. p. line narrow, geminate, regularly and slightly scalloped, with a deeper incision opposite the cell. Subterminal space rather wide, bright brown; s. t. line faint, pale; terminal space rather narrow, dark gray. A dentate black continuous terminal line. Hind wings pale gray fuscous, with pale fringes touched with blackish at extremity of veins; a black terminal line. Beneath pale, powdered with dark scales; an indistinct common outer line; discal lunule filled in and prominent on hind wings, empty on primaries. Abdomen pale; thorax gray, darker shaded on tegulae. Second palpal joint outwardly black. Front white inferiorly below a frontal black line. The collar has no transverse black line, but is tipped with a darker shade. *Expanse* 42 mil. Mass. (Roland Thaxter).

A second specimen in poor condition, from Montreal (Couper), has the wings more obscure, the brown subterminal space improminent. In the type there is merely a black line inferiorly connecting the stigmata along the median vein. In the Canadian specimen the orbicular and reni-

form are connected also superiorly with a black line. The lunate discal mark beneath on hind wings is blackish, distinct and large; on the primaries empty in both specimens. The common exterior shade line on the primaries is even, on hind wings irregular.

Somewhat resembles the description of *A. fernaldi*, Morrison, but the fore tibiae are unarmed. Mr. Thaxter describes the type as from a "cocoon found under pine bark in April, when the larva had not yet become pupa. The cocoon was tough, not unlike that of *cerura*. Larva dull white with blackish markings."

Dryobota stigmata Grote.

♂. Larger than *macdata*, which it resembles in ornamentation. Eyes naked, tibiae unarmed, abdomen tufted along the dorsum. Antennae bipectinate, the pectinations gradually decreasing to the tips. Blackish brown tinged with olivaceous, especially on the subterminal space, and bright brown on the median space below the median vein. Lines black, narrow. Sub-basal space wide. T. a. line arcuate. Orbicular large, concolorous. Reniform large, white, with a green stain. Median lines approximate below the middle and connected on the submedian interspace by a black dash. The reddish brown stain extends between the stigmata and colors the linear irregular median shade. T. p. line dentate superiorly, below vein 3 inwardly arcuate, and here touched outwardly with white. The light green subterminal shading stretches to apices, leaving the costal region of s. t. space dark with white dots. S. t. line faint. A terminal series of cuneate black marks. Hind wings fuscous with mesial line and pale transverse shades, reflecting the large filled dark lunate discal mark from beneath. Beneath pale fuscous, veins darker marked; on primaries the discal mark empty; three costo-apical white dots. Abdomen at the sides with reddish tuftings. Collar with a black line. Pectus purplish. Head and thorax somewhat olivaceous, the latter dark behind. Abdominal tufts blackish. *Expanse* 38 mil. *Hab.* Mass. (Thaxter).

The type has but little of the olive tints of this specimen, but it is not fresh; the markings are similar and I have no doubt it is the same species.

Caradrina bilunata, n. s.

♂. Wings ample. Eyes naked, body untufted. Body and fore wings pale mouse gray with distinct black lunate spot; other stigmata obsolete. Lines faint, wide apart, blackish, approximate at internal margin. Sub-

terminal space a little darker ; s. t. line indistinct. Hind wings white, a little soiled exteriorly. Beneath with distinct black dots on both wings. *Expanse* 30 mil. Hab. Newtonville, Mass., August (Thaxter).

This species is almost unicolorous pale mouse gray, with white hind wings and distinct black discal marks.

CORRESPONDENCE.

DEAR SIR,—

What is the nature and cause of the seeming growth on the eye of *P. philenor* and perhaps other butterflies? I have noticed in examining about 100 specimens of *philenor* that fully one-third of the number have on the eye near the proboscis a cluster of yellow tubes, varying from 3 to 40, and from one-twentieth to one-fourth of an inch in length. They are slender, about the diameter of a small insect pin, and are terminated by a mouth or cup-shaped appendage. I have found them in a few cases on *P. glaucus*, but never on any others. If you can not answer, I would be glad if one of your many subscribers would do so, and also give me the name of any work that may mention the peculiarity.

During a trip this summer I succeeded in obtaining several fine *Argynnis diana* females and a few males. For some reason the male was exceedingly scarce, though I saw quite a number of females, which had not as yet laid their eggs. In crossing the mountains (the line between N. Carolina and Tennessee) I noticed that *Neonympha areolatus* was quite abundant in the valleys along the creeks, while *N. gemma* was found in any numbers above an altitude of 1,000 to 1,500 feet.

Lycaena comyntas with us lays its eggs on Rag-weed, the common garden nuisance. I found one doing so about six weeks ago ; there was white clover within five inches of where she was.

EUGENE M. AARON.

Maryville, East Tennessee, Sept. 12th, 1877.

[Can any of our readers throw any light on the question propounded by our correspondent regarding *P. philenor*?—ED. C. E.]

The Canadian Entomologist.

VOL. IX. LONDON, ONT., NOVEMBER, 1877. No. 11

PIERIS VERNALIS A VARIETY OF PIERIS PROTODICE.

BY THOS. E. BEAN, GALENA, ILLINOIS.

Experiments and observations during 1874-5, supplemented by comparison of a large suite of specimens, seemed to invalidate the specific separation of *vernalis*. Submitting the facts to Mr. W. H. Edwards, he confirmed my opinion, and in the recently issued "Catalogue of the Diurnal Lepidoptera of America North of Mexico," he has placed "*vernalis*" as a variety of *P. protodice*.

The basis for my conclusion is briefly as below :

I. A BROOD FROM PROTODICE.

♀ taken August 15th, 1874. A *protodice* of normal summer form ; being of large size, with ample and dark markings on upper surface of wings and gray scales at base of primaries above, and showing yellowish and rather meagre shading beneath secondaries. This deposited eggs 21st August, which produced larvæ on 25th. Resulting imagines, seven, Sept. 15th. Two of these were not noticeably variant from usual *protodice* ; the remaining five were grades between *protodice* and *vernalis*, one female and four males ; the female and three males approximated *protodice* in varying degrees, and one male was nearer *vernalis* than *protodice* in size and marking.

2. A SERIES FROM COLLECTED LARVÆ.

In 1874, late in September and early in October, a large number of the caterpillars in various sizes were taken from naturalized mustard.

These were brought to the pupa stage with very slight loss, during October and early in November.

No parasites were observed in any stage.

The chrysalids were wintered in a cool room, with but little mortality.*

Imagines appeared 1875, April 14th to May 19th, females more abundant than males, about two to one.

None of either sex were of full size of *largest* captured examples of *protodice*, though several were but little inferior.

The series included scarcely a half dozen of the extreme *vernalis* type, and about an equal number of pronounced *protodice*; between these extremes ranged the large majority of the series, exhibiting a progressive set of intergrades. The prevailing tendency among the grades was towards *vernalis*.

Gradation occurred in regard to every observable point of difference between *protodice* and *vernalis*.

The larvæ from which this series resulted were all practically alike in markings; if any difference it was not perceptible. This larval uniformity seemed to affirm the specific unity of the diverse forms resulting—a conclusion much strengthened by the numerous intergrades.

3. COMPARISON OF CAPTURED SPECIMENS.

My collected set consists of *protodice* chiefly, a less number which are grades, and a very few of the *vernalis* type; the intergrades are amply sufficient to connect the extreme forms.

The butterfly is very rare in spring. About mid-June a few may be seen, a larger brood in July, and an abundant flight in August and September. After the middle of August usually the sequency of broods is more or less obscured, as each successive week shows an increased army of individuals; in scarce years, however, the regular accession of broods is evident.

Captures during June, July, August and early September are almost invariably true *protodice*. In September some grades appear, and with

* The favorable result of this experiment—say 67 butterflies from about 80 larvæ—as compared with the uniform extreme scarcity of *protodice* here in spring in state of nature, suggests that the species is imperfectly inured to our climate, and finds its proper *winter* conditions further south. Out of doors very few of the pupæ seem to escape our severe winters. The butterfly is extremely rare in spring (May), becomes more frequent by July, common and abundant in succeeding months. I have reason to think neither larva nor imago hybernate in this locality.

cool weather a very few *vernalis* also—these in late September and in October until severe night frosts occur. In autumn the grades of earlier dates are nearer the type; those appearing later progressively approach *vernalis*.

I would suggest that the term "dimorphic variety" hardly applies properly to *vernalis*. The variation is multiform, and the intergrade examples largely outnumber the instances of the extreme "*vernalis*" type as described and figured. *Vernalis* is not a variety abruptly contrasting with a type form, but merely the extreme term of a series of variations departing from type.

Vol. I of Mr. Edwards' "Butterflies of N. A." contains plate with accurate and beautiful figures of *vernalis*.

AN ACCOUNT OF SOME FARTHER EXPERIMENTS UPON THE EFFECT OF COLD IN CHANGING THE FORM OF CERTAIN BUTTERFLIES.

BY W. H. EDWARDS, COALBURGH, W. VA.

In May, of the present year, at Coalburgh, I bred a large number of larvæ from eggs laid by *tharos*, var. *marcia*; also several from eggs laid by *ajax*, var. *Walshii*; and from eggs laid by *Lyc. pseudargiolus*; and all of the chrysalids of *tharos*, and part of those of the other two species, were placed in small tin boxes as they formed, and at different intervals thereafter, 10, 20, 60 minutes up to some hours, and one and two days, were laid in the ice box on top of the ice. The box was supplied with ice once a day. I intended removing the chrysalids at irregular periods, so as to see what length of exposure to cold would suffice to change the form of the butterfly, and hoped also to ascertain how soon after the forming of the chrysalis the cold must be applied to produce the desired effect. But the *tharos* chrysalids had scarcely begun to form when I was called to New York, and had to leave charge of them and the larvæ to a member of my family, who followed my directions faithfully as to

placing the chrysalids on the ice at regular intervals. On my return some had been exposed ten days, others but one or two, and I at once removed them and waited to see the result. After six or seven days (which is the usual period of the chrysalis of this species in midsummer), the *tharos* butterflies began to emerge, and as one after another came out quite unchanged, I found that the experiment with them was a failure. A week later the *ajax* chrysalids began to give butterflies, and as they had been exposed to cold some days before I left home, and while I was attending to the ice box myself, the result was better. Some were fully changed, var. *telaemonides* emerging instead of *marcellus*, as would have been the case in nature; others were but partially changed, having the shape of *marcellus*, but the broad crimson anal band of *telaemonides*; and others were not changed at all, but emerged *marcellus*.

Later, one butterfly only emerged from the chrysalids of *pseudargiolus*, a female, and it differs curiously from the type, and from other examples of the same brood which have emerged from the chrysalids not exposed to cold, in that the common series of extra discal spots on under side is wholly wanting, and the marginal crescents form a complete series across both wings and are very large and black, so that these crescents are more conspicuous than in any example I ever saw in the field. The other chrysalids are most of them alive, but the butterflies will not appear before next spring.

The failure of the *tharos* to change led me to test the ice box, and I found that as the ice melted the temperature rose from 45° to 55° in the top of the box. Very likely, also, in my absence, the cover had sometimes been left raised in such a way as to admit air.

Fortunately I had brought back from New York another batch of *tharos* eggs, also of var. *marcia*, obtained in the Catskills, and the larvæ from these I bred in June and July, and placed the chrysalids in the ice box at intervals as before, but this time at the bottom, under the ice, where I found the temperature to be 33° . I had scarcely gotten the last chrysalids in when I was compelled to go East again, and so lost the opportunity of determining the length of time required to effect a change of form, and being detained by the late railroad troubles, I did not return till twenty days had passed. The same day I removed all the tin boxes from the ice. They contained more or less water, and in some was enough to drown the chrysalids.

I divided the chrysalids into three lots. No. 1 contained all which

were exposed to cold at from 1 to 9 hours after forming. No. 2 all at from 30 to 60 minutes after forming. No. 3 at from 10 to 30 minutes. But I discovered afterwards, by a label, that in this last lot were three chrysalids which had not been exposed till two days after forming.

The butterflies began to emerge on the seventh day, and by the ninth all had emerged that were alive. Fully one-half of the chrysalids were either dead or had just life enough to allow the bursting of the case without any expansion of the wings; and of the butterflies several were cripples. No doubt this loss and maiming was in part owing to the water in the boxes, but I think more largely to the tender age of the chrysalids when exposed, their surfaces yet unhardened being liable to injury. But the general result was satisfactory.

Of lot 1 (exposure 1 to 9 hours after forming) there emerged 9 perfect butterflies, 5 ♂, 4 ♀, every one changed. The males were what I call var. D of *marcia*, and though varying much in their under surfaces, were all like examples of the over-wintering brood (*marcia*) taken in the Catskills. Of the 4 females, 2 are good examples of var. C, *marcia*, and vary between themselves considerably, as is usual with that variety. But the other 2 are fine examples of "suffusion," the colors on either side blending, and the definite markings characteristic of the species being lost; also the black color of hind margins of upper side is hoary or griseous. These are such examples as collectors prize as the gems of their collections when taken in the field.

Of lot 2 (exposure 30 to 60 minutes) emerged 5 females, no males. Three are very little, if at all changed, but the other two are very pretty examples of suffusion, though to a less degree than the two before mentioned from lot 1, and the running of the colors is mostly restricted to the under side. The black margins on upper side are, however, much broader than in the normal form, running into and absorbing the extra discal round black spots.

Of lot 3 (exposure 10 to 30 minutes after forming, but with three chrysalids two days after) there emerged two females, no males. One of these I cannot distinguish from the summer *tharos*, and I presume this was from one of the three chrysalids spoken of, though of course I have no certainty of it. But the other is a beautiful example of var. B, *marcia*, the under side of the hind wings being largely melanized.

It would appear not to be necessary that cold should be applied before

the newly formed chrysalis has fully hardened to effect a change of form in case of *tharos*. Last year I found that chrysalids which were exposed at 9 hours after forming changed fully as much as those exposed at 6 and 3 hours. The temperature then was maintained at about 40°, and for 7 days only, and the changes were complete in nearly all the examples treated, but there was no case of suffusion, as has appeared in the present experiment at temp. 33° continued for 20 days; though probably the length of this last period had little to do with the matter, and a much shorter time would have produced the same result. Even with the first experiment this season as related, with an irregular temperature ranging from 45° to 55° and perhaps higher, though no change of form resulted, the cold completely retarded the development of the imago, as the butterflies did not emerge till their full period had passed after removal from the ice.

I think the facts I have stated throw light upon the cause, or a cause, of the phenomena of suffusion, instances of which are recorded in books and are occasionally seen in the field. Severe cold, as, for example, the enveloping of a chrysalis newly formed with ice or snow as it lies under a rock or on the ground, would apparently suffice to cause a blending of the colors in the butterfly.

TINEINA.

BY V. T. CHAMBERS, COVINGTON, KY.

ADELA.

A. bivellata Zell.

I have received both sexes of this species from Prof. Feraud, of Orona, Maine. It is a prettier species than *A. bella* Cham., with the fascia much more distinct. Zeller describes only the ♂. It has the head and palpi dark brown, with a very faint purplish tinge; the antennæ with annulations of dark purple and silvery white; the body and legs dark purple, the legs annulate with white; hind wings pale purplish with darker ciliæ; thorax and fore wings rich deep purple, appearing in some lights to be thickly

dusted with brightly scintillating golden scales ; behind the middle of the fore wings is a straight white fascia, widest on the dorsal margin, darker margined before, and more faintly so on the costa behind ; before the apex is another fascia which does not quite reach the dorsal margin, and which is dark margined before ; Zeller represents this fascia as having a sigmoid outline, but in one of my specimens it is perfectly straight, and in the other scarcely perceptibly sigmoid. *Al. ex.* 7 lines.

The ♀ (a single specimen), now first described, differs only in having the hairs of the head straw yellow ; those of the palpi whitish, and the second fascia reduced to a very short white costal streak. The antennæ are simple in both sexes.

A. bella Cham.

The fasciæ in this species are as stated in the original description in the apical part of the wing, only visible in certain lights and are very indistinct even then ; perhaps it would be more correct not to describe them as fasciæ, but to say that the apical part of the wings is somewhat suffused or overlaid with golden, except three or four narrow indistinct transverse lines, which are of the general hue. In the ♀ the basal half of the antennæ are densely clothed with long scales.

Dicte (Adela) corruscifasciella Cham., CAN. ENT., v. 5, April, 1873.

A. Schlaegeri Zell., Bei. z. Kent, May, 1873.

In my judgment the characters of this and similar species are sufficient to distinguish them generically from *Adela* as represented by such species as *A. bividda*, *trigrapha*, *bella*, &c. Prof. Zeller's figure and description leave no doubt as to the identity of the species described so nearly at the same time respectively by him and by me.

Incurvaria mediotriatella Clem., Proc. Acad. Nat. Sci., Jan'y, 1860, p. 5.

Tinea auristrigella Cham., CAN. ENT., v. 5, p. 86.

I am satisfied that in *T. auristrigella* I have re-described Dr. Clemens' species, though I see no sufficient reason for separating it from *Tinea*. *T. iridella* Cham. will probably also be referred to *Incurvaria*.

PITYS.

P. fasciella, v. 5, p. III, ante.

The former description of this species is not satisfactory. I therefore re-describe it as follows :

Palpi silvery white ; the second joint of the labial pair has a narrow brown line extending along its outer surface ; face white ; vertex rufous ; antennæ pale fuscous. Thorax golden brown above and with a golden brown streak or spot beneath the fore wings, which are golden tinged with brown, and the costal and dorsal margins are brown ; before the middle are two large tufts of raised scales opposite to each other, the inner one brown and the outer one whitish or silvery gray, margined all around with brown, and there are two similar tufts in the apical part of the wing. There are seven small silvery white costal streaks, one before the first pair of tufts and another just behind it, and both pointing obliquely backwards. The third is smaller and placed just before the last two tufts, and is nearly perpendicular to the margin, and the other four are in the apical part of the wing ; there are also seven small dorsal silvery white streaks nearly opposite the costal ones, the third dorsal one (from the apex) connected faintly with its opposite costal one. Ciliæ pale fulvous. *Al. ex.* a little over $\frac{1}{2}$ inch. Kentucky.

XYLESTHIA.

X. Clemensella Cham.

The larva of this species bores in dead locust timber. It may be found abundantly emerging (as imago) from locust fence posts, about the middle of June, and is not uncommon as late as the first of August.

SEMELE.

S. cristatella Cham.

I find that I have occasionally referred to this species as *S. bifasciella*, by which name some of my specimens were labeled before it was published as *S. cristatella*. Probably there is not sufficient reason for separating it generically from the species placed by me in the genus *Pitys*. I am not sure but that two related species are confounded under this specific name, as in some of the species the wings seem a little narrower than in others, and, besides, have a golden spot or longitudinal streak within the costa near the base, and the tufts in the apical part of the wing margined with sordid white or yellow.

NOTE ON LARVAL VARIATION.

BY A. R. GROTE,

Director of the Museum, Buffalo Society Natural Sciences.

In a paper on the Noctuidæ of North America (6th Ann. Rep. Peabody Acad. Sci.) I have stated that we should rather expect the acquirements of fresh character to be more apparent during the period of growth of the Lepidoptera. I have elsewhere (Bull. Buff. Soc., 1, 130) shown that there is proof in the excessive variation in the larvæ of a genus where the adults of the species are remarkably uniform in color and ornamentation, that the larva submits to independent and wide modification from the circumstances of its environment. Under this head I have suggested that all the cases in the Noctuidæ where the larvæ are very different and the imagos very similar of any two forms distinguished by geographical distribution (e. g., *Apatela psi* from Europe and *Apatela occidentalis* from America) may be ranked. And here the numerous cases cited by Gueneé from Abbot's drawings of the larva must probably be included. The case of these "representative" species is especially interesting and will receive in time a more thorough working out when we come to know the immature forms of more of our species.

In this first phase of larval variation we have the difference associated with a separate habitat.

In the next phase we have what Mr. Walsh calls a *phytophagic* variation of the larva. He has shown such to exist with *Hal. tessellaris*, and Mr. Hy. Edwards has shown it with regard to the Californian *H. Agassizii*.

Mr. Walsh's observations on *Sphingicampa distigma* and *Anisota bicolor* I have discussed some years ago, giving good reason to show that an error happened in the matter; the larva of his "*bicolor*" (♀ imagos) not having in reality produced the perfect insects with which he associated them. Hence the "generic" differences in the larvæ associated with "specific" identity in the imagos in this case assumed by Mr. Walsh do not in reality exist. But the phytophagic variation in *Halesidota* is not associated with a difference of habitat; and Mr. Walsh ascribes it to the food plant as the determining condition of the larval environment inducing the variation. The imagos cannot be distinguished.

We have again a third phase in the "species" of *Datana*. Here the variation in the larva is strong in the last moults, and the imagos though almost are not quite identical. The species may be separated without knowing the larva. The two nearest allied forms, *ministra* and *integerima*, have the one uneven, the other even fore wings. The larva of the latter is black with long silky white hairs, wanting in the former, which remains striped. It must be remembered that in an allied genus, *Nadata*, the two species are also separable by the differing margin in the imago; the larvæ are yet unknown. In *Catocala* we have two forms, *C. crataegi* Saund. and *C. polygama* Guen., quite distinct in the larval and very near in the perfect state.

I have briefly brought these facts together here to show that larvæ are independently subject to variation. The small differences in the imagos are usually attended by much greater differences in the larvæ in the case of closely allied "species." An analogy in the differences between closely allied species in different genera is shown in *Nadata* and *Datana*. We may expect similar facts when the history of our *Cerura* becomes known, all bearing on the objective basis for all our "genera" and "species," although certain lepidopterists continue to insist on real distinctions between certain of these artificial divisions. The conceptions of one class of naturalists are treated as corresponding with Nature, the other, not; but with insufficient reason.

NOTES ON THE EGG, LARVA AND PUPA OF SMERINTHUS MODESTA.

BY ROBERT BUNKER, ROCHESTER, N. Y.

Egg— $\frac{1}{16}$ in. diameter; light green, translucent, smooth, circular, oblate or depressed. Hatched in nine days from extrusion. Larva— $\frac{1}{4}$ in. long; light green, slender; head large, round, slightly depressed medially; face pink, with a purplish tinge; extremity of the body dark sea-green, with a large wart or tubercle, pyramidal in form, upon which rests the horn.

1st moult— $\frac{1}{2}$ in. long, apple green, with a light yellow longitudinal stripe below the dorsal ridge; diagonal lines yellowish white; horn purple, straight, very short. 2nd moult— $\frac{7}{8}$ in. long; $\frac{1}{8}$ in. diam.; rich dark green, finely granulated, giving it a beautiful velvety appearance; thorax adorned with two transverse crests or collars, studded with fine points tipped with white. 3rd moult— $1\frac{1}{4}$ in. long; $\frac{3}{8}$ in. diam., thickest medially; light green, otherwise unchanged. 4th moult— $1\frac{7}{8}$ in. long; $\frac{1}{4}$ in. diam.; light green, coarsely granulated, granules studded with fine white points, giving the skin a frosted appearance; crests on thorax much reduced in size. 5th moult—3 in. long; $\frac{3}{4}$ in. diam.; hind crest lost, anterior one much reduced; spiracles small, rust red; true legs brown; pro-legs brownish yellow; horn lost, except a mere rudiment; yellow longitudinal stripes very obscure.

Pupa 2 in. long; $\frac{5}{8}$ in. diam.; dark chestnut brown, cylindrical, holding its size well to the sixth segment, thence tapering abruptly and ending in a point or thorn; head obtuse, thoracic portion round, not angular.

The habits of the larva are singular; before the 1st moult it is much inclined to wander, and goes looping along after the manner of the Geometers; after the 2nd moult it becomes sluggish. It is a voracious eater—in short, an accomplished gastronome. Its manner of feeding differs from that of any larva I have had the pleasure of rearing. It rests with its body stretched out at right angles to the edge of the leaf, and eats with its feet fixed on the side of the leaf, and as the food is consumed moves backward, and when the leaf is consumed to the mid-rib, leaves it to try its gormandizing propensities on a fresh one. As the worm, while feeding, rests as above mentioned, the reason of its leaving the leaf half consumed will be obvious; it would otherwise have no surface to hold on to.

MONTREAL BRANCH OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Fourth Annual General Meeting of this Branch was held on Tuesday, 1st May, at 8 o'clock p. m., at the residence of H. H. Lyman, Esq., the President in the chair.

The following report was read and adopted :

REPORT.

Your Council beg to present the Fourth Annual Report of the Society's operations.

They would refer with pleasure to the satisfactory progress of the Society in the study of our science, evinced by the steadiness with which the monthly meetings have been kept up, and the interesting and valuable papers read at these meetings. Solid progress has been made in the identification and classification of the insects of Montreal, and much preliminary work has been accomplished, the value of which will appear hereafter. The only cause for regret is that our number continues so small, but the zeal and perseverance of the present members go far to compensate for their paucity in number. Your Council entertain the hope that at no distant day our membership will be augmented by the addition of at least a few more students of our useful and interesting branch of natural history.

Twelve meetings were held during the year, at which the following papers were read and presented to the Society :

G. J. Bowles—"List of Eggs and Larvæ Described in the Seven Volumes of the CANADIAN ENTOMOLOGIST."

H. H. Lyman—"Notes on the Occurrence of *Argynnis idalia*."

F. B. Caulfeild—"List of the Geometridæ of Montreal."

W. Couper—"On *Phyciodes tharos*."

H. H. Lyman—"List of Some of the Geometridæ of Montreal."

F. B. Caulfeild—"Notes on Some Species of *Chrysomelidæ* Occurring on the Island of Montreal."

F. B. Caulfeild—"Notes on the Species of *Meloe* in Canada."

H. H. Lyman—"Entomological Rambles, Including Notes on Entomology at the Centennial Exhibition."

G. J. Bowles—"The Noctuidæ of Quebec."

G. J. Bowles—"Notes on D'Urban's Paper in the *Canadian Naturalist*, Vol. v., with Identifications of the Species."

Some progress has been made during the year in the compilation of the "Montreal Catalogue," and the names of 790 identified species are now

entered on the list, comprising 385 Lepidoptera, 367 Coleoptera, 4 Diptera, 15 Orthoptera, 16 Hymenoptera and 3 Hemiptera. The earnest co-operation of the members is requested by your Council in this work. There is no doubt but that it will be of immense value to future students and will form a lasting memorial of our labors.

The finances of the Society have engaged the earnest attention of your Council. They would recommend that the cash on hand be expended in books for our Library, under the direction of the new Council.

The whole respectfully submitted.

GEO. JNO. BOWLES, President.

Montreal, 1st May, 1877.

The following were then elected to office for the ensuing year :

G. J. Bowles, President (re-elected) ; H. H. Lyman, Vice-President ; G. B. Pearson, jr., Secretary and Treasurer (re-elected) ; C. W. Pearson, Curator (re-elected) ; Council—F. B. Caulfeild, Robert Jack, W. Hibbins, jr.

After a pleasant conversation on Entomological subjects, and the examination of numerous specimens, the meeting adjourned.

G. B. PEARSON, JR., Secretary.

NOTES ON LEPIDOPTERA.

BY A. R. GROTE,

Director of the Museum, Buffalo Society Natural Sciences.

Scopelosoma Pettiti.

I have received from Mr. Fred. Tepper a fine and well marked specimen of this species, originally described by me (CAN. ENT., 7, 188) from specimens received from Mr. J. Pettit, of Grimsby, Ont. The new specimen, from Iowa, shows the continuous, even, diffuse and broad median shade very distinctly, running just inside the large reniform and absorbing its exterior orange annulet. The t. p. line has a costal angu-

lation and is otherwise even ; it shows black venular points ; the line itself is double and these black points contrasted with the pale yellow included space. The pale yellow s. t. line is thrice waved. This species is allied to *S. Graefiana*, from which it may be distinguished by its smaller size, its more even wings, which want the terminal festooned line, its paler ground color, straighter median shade, smaller orbicular spot and more prominent subterminal shade. The hind wings are very pale yellow and show a faint subterminal reddish shade in addition to the faint and more irregular mesial line. Beneath this subterminal shade is indicated by fragmentary reddish scales superiorly on both wings. In *Pettiti* the mesial line on secondaries beneath is more flexuous centrally.

Californian Hepiali.

Although Mr. Stretch, in his "Bombycidæ of North America," gives *Behrensii* (fig. 6) as distinct from *montana* (fig. 7), large material, sent by Mr. Behrens, makes me believe that they are opposite sexes of the same species, which should retain the name *Behrensii*. The orange salmon-colored *Behrensii* seem to me the males, and specimens vary from the form described by Mr. Stretch, in which the insect is nearly concolorous, to the more usual form where two silvery fasciæ break the monotony of the wing. The bands composed of light colored spots are more or less visible in the males ; in the females (= *montana*) with fuscous wings, they are more evident. One intermediate specimen (♀) is faintly tinged with reddish. The hind wings have the margins and veins orange in *Behrensii* ; in the ♀ (*montana*) the wing is all fuscous, but this latter tint can be seen in the ♂ on the interspaces.

I have examined the species described by Mr. Behrens (CAN. ENT., viii., 174). I think that the specimen alluded to but not separately named under the description of *sequoiolus* is the female of that species, following out the idea that the sexes differ more than usual in *Behrensii*, to which *sequoiolus* is allied. The form described by Mr. Behrens as *Baroni* seems to me distinct and not the opposite sex of *mendocinolus*. It may be known by the bands remaining grayish fuscous, while the interspaces are shaded with red, not orange. But if the silver bands are a male character this opinion may need revision. The small species *Lenzi*, and the larger *sequoiolus*, can be readily recognised from Mr. Behrens' description of them ; while *mendocinolus* seems to differ from ♂ *Behrensii* by the smaller size, fuscous hind wings and less brilliant color of the primaries.

Lithophane viridipallens, n. s..

♂. Very pale gray green; allied to *querquera*. Thorax and head immaculate pale green with a central black thoracic dot, as in its ally. Lines on primaries faint. Basal dash obsolete. Lines double. Median shade continued, blackish. Reniform smaller than in *querquera*, more constricted, with a less conspicuous interior ring. Subterminal line much as in *querquera*, but without the median and submedian black marks of that species. Terminal series of dots reduced. Fringes concolorous. Hind wings fuscous with whitish fringes. Beneath pale with common line and discal marks, and an almost imperceptible flush. Abdomen pale fuscous, beneath very faintly ruddy. Hab. Mass. (Mr. Roland Thaxter). Size of *querquera*, but differing in the fainter markings, the narrower reniform, while the hind wings are less ruddy.

Syneda Alleni, n. s.

♂. A beautiful species allied to *graphica*, but distinct by the orange yellow secondaries and under surface. Band on hind wings narrow, twice deeply scalloped, angulated on vein 2, where it is joined to the base by black scales along the vein; thick discal lunule. Primaries like *graphica* but more brown; the median shade brown and diffuse; the t. p. line notched below costa; the t. a. line running down to internal margin, slightly projected outwardly on submedian vein. Beneath bright orange yellow, with deep black bands joined and forming Y-marks on both wings. Larger than *graphica*, and a more striking species. *Expanse* 32 mil. Orono, Maine, Mr. Anson Allen, to whom the species is respectfully dedicated.

CATOCALÆ TAKEN AT SUGAR AT CENTER, N. Y.

BY JAMES S. BAILEY, M. D., ALBANY, N. Y.

The following list will show the order in which Catocalæ were taken during July and August, 1877, at sugar, and the number taken each day of each variety, in this particular locality. Center has proven itself rich in Diurnals, and now especially so in Catocalæ. It is singular, after working up the field thoroughly for several years, not a vestige of a Cato-

cala has before this year been seen by the writer. In fact their presence was doubted, until this season a caterpillar was seen. June 28th the first *Catocala* was captured (*C. Clintonii*), and now, Sept. 12th, worn specimens of *antinympa* are seen, and good specimens of *relicta*, *amatrix*, *unijuga*, *habilis* and *cerogama*. The 10th of this month I took 22 *relicta* and 12 *unijuga*.

JULY.

- 23rd, 5 ; 25th, 1 ; 28th, 22 ; 30th, 4 ; 31st, 20.
1. *C. Clintonii*—2nd, 1 ; 10th, 2 ; 19th, 2 ; 21st, 1.
 2. " *polygama*—7th, 1 ; 11th, 1 ; 16th, 2 ; 17th, 2 ; 18th, 3 ; 20th, 1 ; 21st, 2 ; 23rd, 1 ; 30th, 1.
 3. " *var. pretiosa*—3rd, 3 ; 4th, 4 ; 5th, 1 ; 9th, 1 ; 10th, 5 ; 11th, 1 ; 12th, 2 ; 14th, 1 ; 16th, 7 ; 17th, 1 ; 18th, 3 ; 19th, 3 ; 20th, 1 ; 23rd, 2 ; 25th, 4.
 4. " *gracilis*—2nd, 3 ; 3rd, 8 ; 4th, 2 ; 5th, 13 ; 11th, 49 ; 12th, 45 ; 13th, 35 ; 14th, 30 ; 16th, 40. Abundant from 17th to 31st.
 5. " *var. similis*—13th, 5 ; 14th, 12 ; 16th, 28 ; 18th, 18 ; 19th, 31 ; 20th, 30 ; 21st, 52. Abundant from 23rd to 31st.
 6. " *ilia*—7th, 1 ; 9th, 1 ; 10th, 3 ; 11th, 1 ; 14th, 4 ; 16th, 2 ; 17th, 1 ; 18th, 6 ; 19th, 3 ; 20th, 6 ; 21st, 7 ; 23rd, 1 ; 25th, 1 ; 28th, 3 ; 30th, 2 ; 31st, 2.
 7. " *unijuga*—7th, 1 ; 12th, 2 ; 17th, 1 ; 18th, 2 ; 19th, 1 ; 20th, 4 ; 21st, 1 ; 25th, 2.
 8. " *epione*—9th, 1 ; 19th, 2 ; 20th, 1 ; 21st, 1 ; 28th, 2 ; 30th, 1.
 9. " *briseis*—11th, 2 ; 12th, 2 ; 13th, 4 ; 14th, 4 ; 16th, 1 ; 18th, 5 ; 19th, 4 ; 20th, 15 ; 21st, 21 ; 23rd, 13 ; 25th, 4 ; 30th, 8 ; 31st, 5.
 10. " *antinympa*—11th, 1 ; 12th, 2 ; 13th, 4 ; 14th, 6 ; 16th, 3 ; 18th, 4 ; 19th, 13 ; 20th, 12 ; 21st, 33 ; 23rd, 27 ; 25th, 56 ; 28th, 4 ; 30th, 93.
 11. " *concumbens*—14th, 1 ; 20th, 5 ; 21st, 6 ; 23rd, 2 ; 25th, 7 ; 28th, 1 ; 30th, 57.
 12. " *ultronia*—11th, 1 ; 12th, 1 ; 14th, 1 ; 16th, 1 ; 18th, 5 ; 19th, 1 ; 20th, 2 ; 21st, 5 ; 23rd, 3 ; 25th, 5 ; 30th, 6 ; 31st, 2.
 13. " *praeclara*—12th, 1 ; 13th, 1 ; 14th, 1 ; 18th, 1 ; 19th, 2 ; 20th, 1 ; 21st, 1 ; 23rd, 7 ; 25th, 12 ; 30th, 16.
 14. " *crataegi*—12th, 1 ; 14th, 1 ; 17th, 1 ; 21st, 2.
 15. " *relicta*—12, 2 ; 17th, 1 ; 18th, 3 ; 19th, 4 ; 20th, 6 ; 21st, 4 ;

16. *C. androphila*—16th, 1 ; 18th, 4 ; 19th, 6 ; 20th, 6 ; 21st, 20 ; 23rd, 9 ; 25th, 16 ; 28th, 24 ; 30th, 30 ; 31st, 45.
17. " *grynea*—17th, 1 ; 18th, 3 ; 19th, 4 ; 20th, 1 ; 21st, 1 ; 25th, 2 ; 28th, 6 ; 31st, 2.
18. " *minuta*—18th, 2 ; 21st, 1.
19. " *var. parvula*—19th, 1.
20. " *Meskei*—18th, 2 ; 20th, 1.
21. " *coccinata*—18th, 1 ; 20th, 1 ; 21st, 1 ; 28th, 1.
22. " *parta*—19th, 1 ; 20th, 1 ; 28th, 1 ; 30th, 1 ; 31st, 2.
23. " *tristis*—20th, 1.
24. " *insolabilis*—20th, 1.
25. " *fratercula*—20th, 1 ; 23rd, 2 ; 25th, 2 ; 28th, 3 ; 30th, 1 ; 31st, 1.
26. " *var. " (suffused)*—20th, 1 ; 23rd, 1.
27. " *palaeogama*—20th, 1.
28. " *var. phalanga*—20th, 1.
29. " *cerogama*—25th, 1 ; 28th, 1 ; 30th, 3.
30. " *residua*—25th, 1 ; 28th, 2 ; 30th, 2.
31. " *piatrix*—28th, 1.
32. " *recta*—30th, 1.
33. " *habilis*—30th, 2.
34. " *var.*—31st, 1.
35. " *faustina*—31st, 1.
36. " *cara*—31st, 1.

AUGUST.

1. *C. concumbens*—1st, 3. Abundant from 3rd to 31st.
2. " *androphila*—Abundant throughout the month.
3. " *antinympa* " " "
4. " *ilia*—1st, 1 ; 7th, 1 ; 10th, 1.
5. " *habilis*—1st, 1 ; 3rd, 2 ; 4th, 1 ; 7th, 6 ; 8th, 8 ; 10th, 6 ; 13th, 8 ; 18th, 2 ; 20th, 11 ; 22nd, 4 ; 24th, 3 ; 27th, 5 ; 29th, 3 ; 31st, 6.
6. " *ultronia*—1st, 1 ; 3rd, 1 ; 6th, 1 ; 7th, 1 ; 10th, 1.
7. " *polygama*—1st, 1 ; 3rd, 2 ; 20th, 1.
8. " *residua*—1st, 2 ; 3rd, 2 ; 4th, 2 ; 7th, 2 ; 10th, 6 ; 13th, 1 ; 20th, 2 ; 24th, 1.
9. " *piatrix*—3rd, 1 ; 7th, 1 ; 18th, 3.

10. *C. relictæ*—3rd, 2; 4th, 1; 6th, 8; 7th, 13; 8th, 7; 10th, 42; 13th, 28; 18th, 11; 20th, 17; 22nd, 26; 24th, 43; 27th, 30; 29th, 37; 31st, 34.
11. " *briseis*—3rd, 1; 6th, 1; 7th, 3; 8th, 1; 10th, 4; 13th, 1; 18th, 3; 22nd, 3; 31st, 2.
12. " *cerogama*—3rd, 2; 4th, 3; 7th, 6; 8th, 1; 10th, 14. Abundant from 13th to 31st.
13. " *cara*—3rd, 1; 4th, 1; 7th, 2; 8th, 2; 10th, 7; 13th, 1, 27th, 5; 29th, 1; 30th, 1.
14. " *amatrix var. nurus*—4th, 1; 6th, 1; 22nd, 1.
15. " *unijuga*—6th, 1; 7th, 1; 10th, 1; 22nd, 3; 31st, 13.
16. " *epione*—6th, 1; 10th, 1.
17. " *præclara*—6th, 8; 10th, 6; 22nd, 3; 29th, 1.
18. " *palæogama*—7th, 1; 13th, 1; 29th, 2.
19. " *var. phalanga*—7th, 2; 27th, 2.
20. " *relecta*—10th, 2; 13th, 1; 18th, 2; 27th, 4; 29th, 7; 31st, 5.
21. " *amatrix*—18th, 1.
22. " *desperata*—18th, 3; 20th, 4.
23. " *obscura*—20th, 1.
24. " *subnata*—20th, 1.

CORRESPONDENCE.

WHAT IS THE FUNCTION OF THE FORCEPS IN FORFICULA?

DEAR SIR,—

In looking at the authorities upon this subject, I find that Westwood says "they are weapons of offence and defence," but he gives no proofs. De Geer tells us "quand quelqu' autre insect approche du Perceoreille, il tache de le pincer avec cet instrument en courbant le ventra en haut ou vers le côté, *mais sans produire beaucoup d'effet.*" That I can readily believe. Serville says "cette pince lui sert d'arme defensive, *quoique peu redoutable!*" That is also true—*peu redoutable—tres peu!* The co-existence of the forceps renders them by no means a formidable weapon. But De Geer also says, "Le male s' approche à reculons de la femelle dont

il tâte le ventre avec sa pince pour rencontrer l'endroit par ou il doit s'unir à elle, &c." This is a more reasonable use of the instrument, but not the only nor most important one.

Last summer I had a good opportunity of observing the habits of this insect, for every night numbers of them came into my study window in the country, and lighted very conveniently upon the table at which I was writing. Each one of them, before he took flight, for they were active, would bend his body back and *lift up the short elytra with his forceps before the wings would expand*, and this they did invariably. They would do this a dozen times in as many minutes, and not one of them ever took flight without performing this manœuvre. The forceps were not used to fold the semicircular wings, but only to elevate the wing covers before flying. I have examined a number of writers upon *Forficula*, but not one of them mentions this remarkable fact, which I observed for many consecutive nights, and I have no doubt of the truth of it. This, then, I believe is the real and perhaps only function of the instrument.

JNO. G. MORRIS, Baltimore.

EREBUS ZENOBIA.

DEAR SIR,—

On the night of the 6th of September, 1877, George C. Thomas took near Racine, Wis., a fine male *Erebus zenobia* Cram. On the night of the 15th of September I captured, in similar condition, a female of the same species. So far as I can learn, there is but one other instance of this species being taken in North America. H. Strecker says that one specimen was taken at or near Davenport, Iowa, several years since. The taking of this West Indian species at Racine is but adding another to the numerous instances where Southern forms visit us. I have repeatedly called attention to this peculiarity of the Racine fauna. Southern forms go much further north than they do east of the great lakes; especially is this true of birds and insects.

I send a photograph of the ♂. Expands 5 inch; ♀ 7 inch.

P. A. HOY, M. D., Racine, Wisconsin.

[We are greatly indebted to Dr. Hoy for the photograph of this rare and very interesting insect.—ED. C. E.]

FOOD PLANTS OF *H. MAIA*.

DEAR SIR,

I am reminded by Robert Bunker's remarks on the food plant of *Hemileuca maia* (p. 119 of current volume of CAN. ENT.) that in 1874, in a circular issued from the Department of Public Instruction of the State of Illinois, I wrote the following :

"Our savants in Entomological lore give Oak, Willow and Spiraea as usual food plants for the larvae of *Hemileuca maia*, but here, on or near these spacious marshes [along Calumet River, south of Chicago] these plants are scarcely abundant enough to warrant so numerous an array of the perfect insect. The unavoidable inference, therefore, is that either some other food plant is specially abundant in the locality, or else some other feature of the neighborhood which, perhaps, has hitherto escaped the attention of Entomologists, constitutes to them a strong attraction."

The tract of country alluded to is just such a swampy locality as Mr. Bunker speaks of in his communication. No doubt the list of food plants for these larvae is yet far from complete.

O. S. WESTCOTT, Racine, Wis.

DEAR SIR,—

From among numerous fine captures during this last season I mention the following as being of especial interest to many collectors, as they were taken in the Township of Roselle, New Jersey :

Sept. 1st—*Catocala marmorata*, *relicta* and *unijuga*. The former was resting upon a white oak.

The following Sphingidæ in larval form are secured ; the first is of exceeding great rarity : *Smerinthus astylus* and *myops* ; *Cressonia juglandis* ; *Darapsa versicolor*.

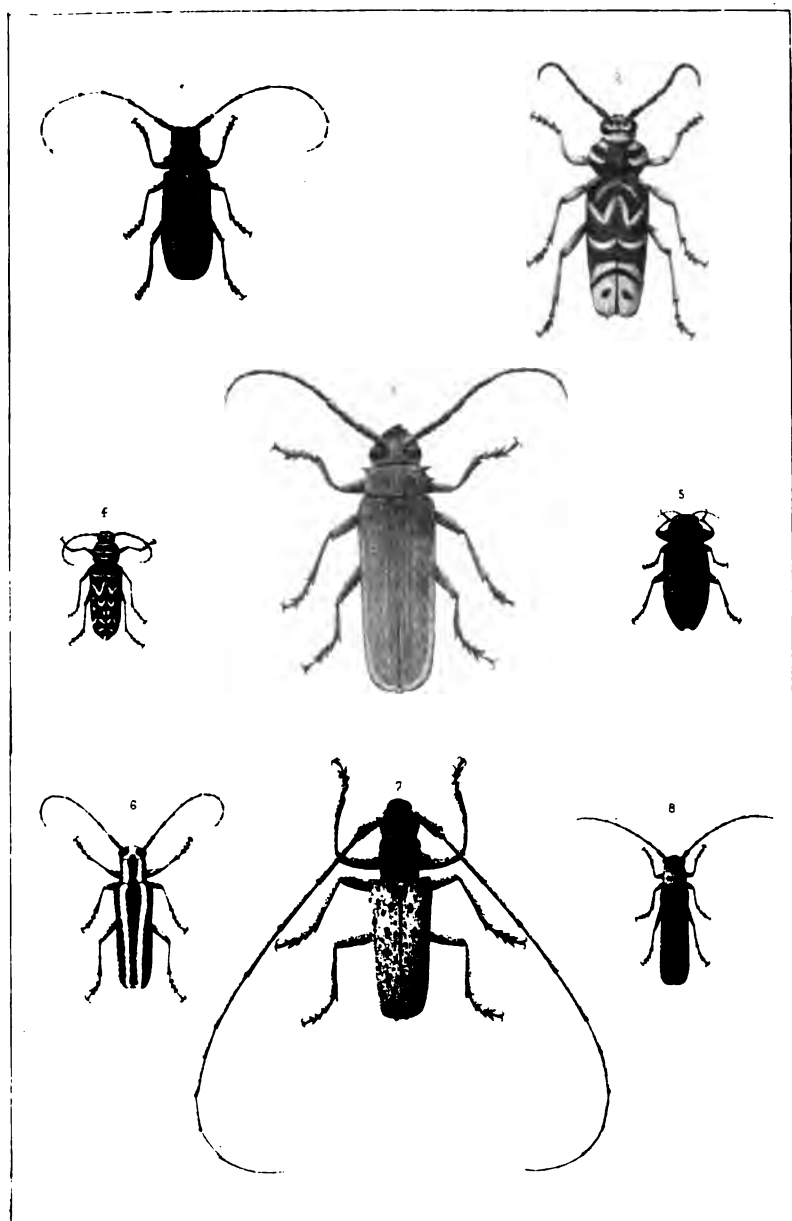
GEO. W. PECK, 226 Pearl St., New York.

DEAR SIR,

I would suggest that the "seeming growth" observed by Mr. Aaron on the eye of *P. philenor* is nothing but the pollen of the flowers visited for honey by the butterfly. In this way Darwinists believe that cross-fertilization is effected in many plants, and they show also that such cross-fertilization is beneficial to plants.

A. R. GROTE, Buffalo, N. Y.





L. Trouessart

The Canadian Entomologist.

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No. 12

A FEW COMMON WOOD-BORING BEETLES.

BY THE REV. C. J. S. BETHUNE, M. A., PORT HOPE, ONT.

Our Canadian wood-boring beetles, with the exception of a few somewhat minute species, belong to the two great families of Buprestidæ and Cerambycidæ. These include an immense number of different genera and species; in Crotch's List of the Coleoptera of North America (north of Mexico) there are enumerated the names of no less than 169 species of the former family and 552 of the latter; about one-third of these are found in this country. It is evident, then, that to give a bare list of all our Canadian species of wood-borers would occupy no little space, while a detailed description of them, if one were competent for the task, would fill many numbers of this journal. We propose, therefore, on the present occasion to merely give a brief account of the eight species depicted on the accompanying plate. These we have selected on account of their frequent occurrence in almost all parts of the country, and the consequent familiarity of their appearance even to non-Entomologists. Our readers will, we are sure, be pleased with the beauty of the figures, which have been admirably drawn upon stone by Mr. L. Trouvelot, of Cambridge, Massachusetts.

Taking the species in the order in which they are numbered on the plate, we come first to

1. *Monohammus scutellatus* Say—A Pine Borer.—This beetle, which derives its specific name from its conspicuously white scutellum, is of a shining black colour on both the upper and under surfaces, thickly punctured with irregular impressions; on the wing-cases there are, as shown in the figure, a number of scattered whitish spots of various shapes and sizes; these, on close inspection, are found to be composed of dense

short white hairs, which often become rubbed off and disappear; the thorax is armed on each side with a thick triangular spine; the antennæ are many-jointed, and about the same length as the body in the male, while in the female they are about twice that proportion. The size of the beetle varies from less than half an inch in the male to over three-quarters of an inch (exclusive of the antennæ) in the female. The larva is a large thick white grub, destitute of legs, divided into a number of well-marked segments; the head armed with a strong pair of jaws. The larva infests the Pine, after the timber has been cut or newly fallen, and often causes serious injury to it by boring large oval-shaped holes which extend for long distances through the interior of the log. The perfect insects appear in June, and are sometimes very abundant; we have occasionally found them swarming in great numbers on fallen pine trees. The insect is common throughout Canada and the neighbouring States.

2. *Clytus speciosus* Say (genus *Glycobius* Lec.)—The Maple Borer.—The colours of this remarkably handsome insect are deep velvety black and bright yellow. The figure represents its shape and markings so accurately that further description is unnecessary; the size depicted, however, is decidedly above the average. This wasp-like beetle is not very abundant, but may occasionally be found on Maple trees, which its larvæ infest both when growing in the forest and also when cut into cord-wood. The eggs are laid by the parent beetle on the trunk of the Sugar-maple during the middle of summer; when hatched the grubs penetrate through the bark and make long winding borings through the solid wood. Occasionally they are very destructive to young Maple trees, but on the whole they are not sufficiently numerous to be objects of dread.

3. *Orthosoma cylindricum* Fab.—A Pine Borer.—This large beetle is the commonest and best known of our wood-borers; its habit of flying through open windows into lighted rooms during the warm evenings of July, usually to the great alarm of the inmates, has caused its appearance to be very familiar to every one. It is one of our largest beetles, measuring oftentimes as much as an inch and a half in length by over a third of an inch in breadth. Its general colour is a chestnut brown, approaching black on the head and antennæ. The thorax is armed with three sharp spines on each side; each wing-case has three slightly elevated ridges running lengthwise for nearly the whole length; the eyes, which are

situated behind the antennæ, are enormously large and very conspicuous. The larva is a large fat white grub, with powerful jaws of a darker colour ; it feeds upon the wood of the Pine, and from its size often injures the timber very materially.

4. *Clytus robinia* Forst.—The Locust tree Borer. (The synonymy of this insect has been rather perplexing ; it is now included in the genus *Cyllene* Newm. ; for a long time we were accustomed to call it *Clytus flexuosus* Fab., but the specific name given above has the priority. It was also long considered to be identical with *C. pictus* Drury, that bores into the Hickory, but the late Mr. Walsh proved satisfactorily that the two species are distinct.)—The general colour of this insect is deep black with light yellow stripes ; on the head and thorax these stripes form narrow transverse bands, but on the wing-covers there is first of all a narrow yellow anterior edging (not shown in the figure), then a slightly flexuous stripe (not straight as in the figure) ; this is followed by a narrow zig-zag band forming a letter W across the wings, and three irregularly wavy and broken stripes ; there is also a yellow dot at the tip, and broader stripes on the sides of the abdomen of the same colour. The antennæ are long and many-jointed, and of a dark brown colour ; the legs are long and of a tawny hue. The larva is a whitish coloured grub, about an inch long and the thickness of an ordinary goose-quill, and is furnished with six very minute legs. When young it appears to bore chiefly into the sap-wood, but afterwards strikes off into the solid wood of the tree, perforating it in every direction. Its presence is early indicated by the little heaps of saw-dust extruded from the holes, and accumulated about the base of the tree.

The history of this insect is rather a curious one. For a little over a hundred years it has been known to inhabit the State of New York, its appearance and habits being recorded by some English Entomologists of the last century. About thirty years ago it was found as far west as Chicago, whence it spread throughout the State of Illinois, but it was not till 1863 that it reached Rock Island, about 200 miles further west, where—Mr. Walsh relates—it suddenly appeared in great swarms and utterly destroyed all the Locust trees. The first record we have found of its appearance in Canada is by Mr. Couper, who states (*Can. Journal*, 1855, p. 377) that he observed some Locust trees attacked by this insect in Montreal in September, 1855. In 1862 it began to be very destructive to the Locusts in Toronto, and for several years was excessively abundant

there. In 1873 Mr. Reed relates its appearance in enormous numbers at London, Ont. ; now it appears to be generally distributed throughout this province, and occasionally becomes very injurious to these ornamental trees. The perfect insect, in the localities it frequents, may usually be found in September on the flowers of the Golden-rod (*Solidago*), of which it eats the pollen, as well as upon the trunks of the trees it infests.

5. *Chrysobothris femorata* Fab.—An Apple tree Borer.—This insect belongs to the family Buprestidæ, while all the others on our plate pertain to the Cerambycidæ ; the difference in shape and structure, and especially in the length of the antennæ, is very noticeable in the figures. The beetle, which may be found basking on the tree-trunks in the hot sunshine in the end of June or during July, is very lively when danger threatens and will take wing instantly if an attempt is made to catch it. Its blackish colour above so much resembles the bark of the tree that it readily escapes the notice of an ordinary observer ; but beneath it is of a beautifully burnished dark copper colour, looking as if it were made of metal ; beneath the wing-covers it is bluish. While the figure gives the shape of the insect very correctly, it much exaggerates its size, which seldom exceeds three-eighths of an inch ; the light spots on the wing-cover are also erroneous in being very much too conspicuous. The larva is a long flattened grub, with an enormously large flat head in proportion to the rest of its body. When first hatched from the egg it eats the soft sapwood of the Apple tree, but afterwards it bores into the harder interior. As it especially attacks young trees, it is often terribly destructive to newly-planted orchards.

6. *Saperda candida* Fab.—An Apple tree Borer.—This insect, which rivals the foregoing species in the injuries it inflicts upon Apple trees, is a pale-brown beetle with two chalky-white longitudinal stripes running from the head to the apex of the wing-covers ; its under side, legs and face are also chalky-white, and its antennæ a little darker ; its length is about three-quarters of an inch. The larva is of a pale yellow or whitish colour, with a brownish polished head and black jaws ; it is destitute of legs, but like other larvæ of the same family, it is enabled to move in its burrows by the contraction and expansion of its well-defined segments ; when fully grown it is about an inch long. It may readily be distinguished from the preceding species by its cylindrical and more symmetrical shape.

Thus far this most injurious insect has only been found in certain portions of this country, being very abundant in the Niagara district, and in the neighbourhood of Montreal and Quebec, but happily rare, or entirely absent, from almost all other parts.

7. *Monohammus confusor* Kirby.—A Pine tree Borer.—This fine beetle, which is especially remarkable for the extraordinary length of its antennæ, is, in our Pine regions, one of the most common and destructive of our insect enemies. Its general colour is an ashen grey, mottled with variable darker spots; the scutellum is white; there are also patches of whitish colour on the head, thorax and abdomen. These variations of colour, being due to a covering of very fine short hairs, which oftentimes are rubbed off, are not to be depended upon in the determination of the species. As in *M. scutellatus* (fig. 1), each side of the thorax is armed with a short thick spine. The length of the insect varies from three-quarters of an inch to an inch and a half—the average size being over an inch; the antennæ of the males vary in length from one and a half to three inches; those of the female are somewhat shorter. The larva is a large, white, somewhat cylindrical grub, destitute of feet. During the summer the female lays her eggs in crevices of the bark of the white and red pine, selecting for the most part timber that has been scorched by fire, or felled by the wind or the lumberman's axe; the larva when hatched soon eats its way into the wood, and before this period of its existence is closed it often burrows immense galleries through and through the solid interior. As it lives a long time in the larval state, the perfect insect is frequently only developed after the timber has been built into a house, and then suddenly emerges from its concealment to the great consternation of the inhabitants of the dwelling. The larva, when burrowing in the wood, makes a loud noise like the boring of an auger, which on a still night may be heard for a considerable distance. The species is very generally distributed throughout Canada and the Northern States; in the pine-growing regions it is often excessively abundant. The late Mr. E. Billings relates that he once saw a pine tree near Lake Clear, in the county of Renfrew, on which he calculated that there were at least three hundred individuals of this species, while numbers more were flying about in all directions. As the insect attacks the cut timber when left over summer in the woods, it is a very serious injury to the operations of the lumbermen of this country.

8. *Oberea tripunctata* Fab.—The Raspberry Borer.—We now come to the last insect on our plate ; the figure is a good deal exaggerated in size, the length of the beetle being under half an inch, and its width one-tenth of an inch. Its colour is deep black, with the exception of the thorax above and the front part of the breast beneath, which are rusty yellow ; on the thorax there are three small elevated black dots arranged in a triangle (not two only, as in the figure), whence is derived the specific name of the insect. The antennæ are nearly, if not quite, as long as the body. The beetles are usually found in July and the beginning of August ; they attack all the varieties of raspberry, and come into gardens from the fields and clearings, where we have often taken specimens and observed their work. The mode of attack is peculiar : the first appearance of injury is usually manifested by the withering and drooping of the ends of the young shoots. On inspection, it is found that at the base of the affected part there are two rows of punctures, half an inch apart, running completely round the canes, and so girdling them that the supply of sap is stopped and the tops necessarily soon wither and break off. The parent insect begins by cutting with its jaws a series of small punctures side by side around the cane, six or seven inches from the top. As soon as the first row is completed, it turns round, and facing the other way, cuts a second row measuring the length of its own body. These two girdles being completed, it makes a small hole a little way above the lower girdle and deposits in it its small yellow egg. The whole operation occupies an hour or more. From this egg there hatches out in a few days a small yellow footless grub, which proceeds to burrow downwards, eating the pith of the cane and eventually causing its destruction.

In order not to occupy too much space, we have forborne to make any mention of remedies which have been applied with more or less success to combat the ravages of these destroyers. Should any of our readers desire information upon this point, we beg to refer them to the Entomological Society's forthcoming Report to the Legislature, which will include many particulars regarding these insects which we have not given above.

AMERICAN ENTOMOLOGICAL SOCIETY—NOTICE OF REMOVAL.—The American Entomological Society has removed to the south-west corner of Nineteenth and Race Streets, Philadelphia, Pa., where all correspondence, &c., should be addressed. Chas. A. Blake is Corresponding Sec'y.

A NEW GENUS OF TORTRICIDÆ.*

BY A. R. GROTE,

Director of the Museum, Buffalo Society Natural Sciences.

In the early spring, from the middle to the end of April, Prof. Lintner and Mr. Hill have taken near Albany a rather small and inconspicuously colored moth, remarkable for its diurnal activity. At first sight I did not recognize it as belonging to the Tortricidæ, but on examination it shows the family characters and seems to be allied to the European genus *Cheimatophila*. But it is not vein 4, but vein 5 that is wanting on the hind wings, and the other characters sufficiently separate our species.

Exentera, n. g.

Sub-median vein of secondaries hairy above at base. Ocelli. Eyes naked. Antennæ of the male brush-like, of the female simple. Fore wings narrow, long, with parallel costal and internal margins; apices not produced; external margin short and even; 12-veined, all the veins separate; vein 1 furcate at base; 2 from median at two-thirds from the base; vein 7 joins the external margin below apex; 10 is thrown off nearly mid-way between 9 and 11. Hind wings 7-veined, 5 wanting; 6 and 7 from one point; 3 and 4 near together at base; 2 at three-fourths from the base of wing. Fringes moderate; ovipositor slightly exerted. Palpi bushy, third article moderate. Front hairy, thorax smooth, legs untufted.

Exentera apriliana, n. s.

♂ ♀. Concolorous, dark olivaceous fuscous, a little mottled, immaculate; hind wings smoky fuscous, sub-pellucid, paler beneath. Under the glass the fore wings and thorax are seen to be covered with whitish-tipped fuscous scales. Length of ♀ primary 11 mil.; length of ♀ body 9 mil.

* Prof. C. H. Fernald, Orono, Maine, is now engaged in the study of our N. Am. Tortrices, and I have relinquished to him my accumulated material for the purpose. I hope my friends will supply him with the necessary material to enable him to give us a full and much needed paper on the group.

SEXES OF HOMOPTERA LUNATA.

BY THOS. E. BEAN, GALENA, ILLINOIS.

For the purpose of further testing conclusions stated on p. 174 regarding *Homopteras lunata*, *edusa* and *Saundersii*, I have secured all observed at my sugar since the former writing.

There are 38 "*lunata*," 23 "*Saundersii*" and 18 "*edusa*." Having opportunity to examine these while fresh, I observed the anatomy of the sex organs in each specimen as captured. The result verified the view previously advanced—the *lunata* were all females, the *Saundersii* and *edusæ* all males.

In regard to the wing-markings, the comment already printed applies equally to this lot of specimens; in addition I may say that there appears to be somewhat greater variation of t. p. line among the females (*lunata*) than in the two series of males (*edusæ* and *Saundersii*).

A large proportion of these specimens—nearly one-half—were taken in September; of those obtained in previous years a majority were captured earlier in the season.

It will be noticed the numerical proportion between the sexes, and also between the two male forms "*Saundersii*" and "*edusa*," already printed, is pretty well sustained in the present lot. The proportion of about 4 "*Saundersii*" to 3 "*edusæ*" is perhaps a tolerable approximation to their relative abundance here, as it was during the past summer my aim to secure all observed.

A note from Mr. Grote advised examination of the frenulum. I have applied this test to each of the 162 specimens, with result confirming the conclusion already reached. This structure is uniformly simple in "*edusa*" and "*Saundersii*," and compound in "*lunata*."

NATURALISTS' DIRECTORY.—A new edition of this convenient publication is promised about May next. Besides containing as complete a list of the names of Naturalists as it is possible to obtain, it is to embrace a list of all the scientific societies in North America, their location, officers and active members. Any communications relating to this Directory should be addressed to S. E. CASSINO, Salem, Mass.

DESCRIPTION OF PREPARATORY STAGES OF NEONYMPHA
SOSYBIUS.

BY W. H. EDWARDS, COALBURGH, W. VA.

Egg laid July 16th, on grass, the female being confined in a bag over a tuft of grass set in a flower pot. Shape nearly that of a semi-ovoid, the base being flattened and the sides at base rounded, the surface under a low power smooth, but under a higher seen to be covered with shallow thimble-like depressions; color greenish-white.

Hatched July 20th.

Young larva—Length .09 inch.

Shape cylindrical, but marked by five or six longitudinal tuberculated ridges; each tubercle sending out a clubbed white hair, some of which are curved forward, others back; color white; head much larger than second segment, rounded, bilobed, rather broader than long, the vertices without processes, pilose, shining black. Duration of this stage 6 days.

After 1st moult—Length .2 inch. Shape cylindrical, thickest in the middle, tapering evenly either way, so that 2nd segment is of about same breadth as 12th; tail forked; color light green; covered with fine white tubercles, arranged in longitudinal rows, not quite regularly, each tubercle sending out a white hair; the space between the two dorsal rows is rather broader than between the rows elsewhere, presenting a clear green medio-dorsal stripe; and at extreme edge of dorsum is also a green stripe, but narrower; legs, pro-legs and under side green; head considerably broader than 2, rounded, a little depressed at top, angular at the sides below; color green, darker than body, much covered with fine white, pubescent tubercles; ocelli and mandibles brown. To next moult 7 days.

After 2nd moult—Length .36 in. Shape as before, and similarly marked, the tubercles of unequal size; the largest arranged in the longitudinal rows, but many small ones placed on the ridges caused by the creasing of the several segments; color blue-green; head no broader than 2, yellow-green, shaped and marked as before. To next moult 6 days.

After 3rd moult—Length .42 inch. Stout, thickest in the middle, rounding somewhat dorsally; color pale green; on either side of the

darker medio-dorsal stripe the row of white tubercles forms quite a broad stripe, another one at edge of dorsum, and another at base, over feet ; the head emerald green, shaped as before. To next moult 5 days.

After 4th moult—Length .56 inch. Without another moult this stage continued till maturity.

Mature Larva—Length .76 inch. Cylindrical, obese, thickest in the middle, rounded dorsally, and sloping slightly to 11, then rapidly to last segment, which ends in forked, divergent tails ; color emerald green, much covered with fine yellow tubercles placed on the ridges caused by the creasing of the segments, and with larger tubercles disposed in longitudinal rows ; each tubercle giving out a fine and short white hair ; at base of body the stripe is more heavily tuberculated than on dorsum ; on either side of a clear, dark green, medio-dorsal stripe is a tuberculated stripe, and another at edge of dorsum ; under side, legs and pro-legs, nearly same green as above ; head rounded, broader than high, bilobed, and but little depressed at the suture, somewhat flattened frontally, broader than 2, equal to 3 ; covered with yellow, conical, fine points, arranged in close vertical rows, and at same time in transverse rows also ; the ocelli black, mandibles brown.

The larva suspended in form of figure 6. Duration of this stage 7 days.

Chrysalis—Length .4 inch ; greatest breadth .1 inch. Cylindrical, the abdomen stouter than anterior portion ; mesonotum rounded, carinated ; the head case truncated, scarcely projecting beyond the mesonotum, slightly arched at top, narrow, beveled at corners ; the wing cases flaring a little on dorsal side, the neuration of wings seen distinctly ; color green, on the abdomen yellow-green ; on either side of dorsum on abdomen is a small ridge, and on either side of this are three black dots, placed in pairs between the mesonotum and extremity ; on either side below wing cases a brown stripe ; the keel of mesonotum brown, and the wing cases are crooked along the principal nervures, and on the margin is a black dot at the end of each nervule. Duration of this stage 13 days.

This species is very common in this part of West Virginia, and is found over the Southern and Southwestern States and in Mexico. Here it is two brooded. It flies in company with *gemma* and *eurytris*, keeping within the edge of the forest, or if in the open country, is always near timber. The egg is shaped very much like that of *eurytris*, but still more

like the eggs of certain *Papilio*, *turnus* for instance, but is netted on surface like the former and unlike the latter. It is quite different from the egg of *nephele*, and the egg of *gemma* is globular. The young larva is very different from that of *nephele*, but as it passes its several stages the larva grows surprisingly like the corresponding stages of *nephele* both in shape and color, while at every stage it is very unlike *gemma* in these respects. It is less like *eurytris* in shape than *nephele*. On the other hand, the chrysalis is very like that of *eurytris*, wholly unlike that of *gemma*, and pretty near that of *nephele*. In these preparatory stages its affinities are with *eurytris* in egg and chrysalis, with *nephele* in larva, and as unlike *gemma* in larva and chrysalis as if the latter were an *Apatura*.

INSECTS FEEDING ON GLEDITSCHIA.

BY V. T. CHAMBERS, COVINGTON, KY.

Helice pallidochrella Cham., and *Agnippe bicolorella* Cham.

My observations on both of these species scarcely permit me to doubt that their larvæ feed in some way on the Honey Locust (*Gleditschia tricanthos*), though neither of them has been bred from the larva. I have, however, met with a larva from which I have not succeeded in breeding the imago, and which I believe to be the larva of one of these species. It is a *Gelechia*-like larva, about half an inch long, with sixteen feet, and feeds inside the seed-pods of the *Gleditschia*, on the honey-like substance found in them, and not, so far as I have observed, on the seed. Its head is very pale ferruginous, the other segments being of a pale apple green, with very indistinct darker spots. I have met with it in September and October, but have never found it in the old pods in the spring, wherefore I think it probable that it leaves the pods to pupate. It is most probably the larva of *H. pallidochrella*. This species will be considered—and is—a *Gelechia* in the wide sense—the sense in which it is a convenient receptacle for every species that cannot be better disposed of.

And as I had previously described a very different species as *G. pallidochrella*, I suggest for this species the specific name of *gleditschiella*.

While upon the subject of species feeding on *Gleditschia*, I wish to call the attention of Coleopterists to two species of Buprestidæ which feed upon this tree. I have never bred either, and have met with each only once, one of them in the larval, the other in the pupal condition. The larva, which resembles that of a *Brachys* more closely than it does that of any other genus known to me, feeds inside the thorns, and is about $1\frac{1}{4}$ lines long. It is depressed and narrows rapidly from the third segment back to the tenth, the remaining segments being again dilated.

The other species feeds in the seed. The only specimen that I have met with was a dead pupa found in a seed in May. The entire contents of the seed had been consumed, and the pupa fitted the pericarp so accurately that it looked as if the contents had been metamorphosed into the pupa—as in a sense they had—while the pericarp itself was intact. In breaking open the seed the pupa was somewhat crushed, and it may prove not to be that of a species of Buprestidæ, but I think it belongs to that family. The pupa having so nearly the shape and size of the bean or seed of the *Gleditschia* is about three lines long by two wide, and depressed. There is no danger of mistaking the larva of *Laverna gleditschiella* Cham. for that of either of these species.

In this connection I wish also to refer again to the very singular larva mentioned in the CAN. ENT., v. 8, p. 137, and to add to the account there given of it that the maxillæ are enormously developed and are used as aids to progression—not exactly as legs, perhaps,—but they are applied to the surface as if the insect was feeling its way with them. Their eyes are reduced to the merest points—indeed I am not sure that these points are eyes—and enclosed in the darkness of the thorn it has more use for “feelers” than for eyes. *Laverna gleditschiella*, however, which likewise feeds in the thorns, has the eyes well developed. The other larva tumbles about helplessly on a plain surface, being unable to walk on it. It requires a tubular place or cavity like the inside of the thorn, where by arching its body the dorsal tubercles can be brought to bear on one surface, while its ventral legs bear on the opposite one, and then it progresses easily enough. Using what is called the live-box or animalcule cage by microscopists, placing the larva between the glass and its brass setting, it courses around actively, using its dorsal tubercles as legs. I have never succeeded in rearing it, and do not know to what order it should be referred.

Laverna gleditschiella Cham. is much subject to the attacks of hymenopterous parasites in its larval condition. Yet it is difficult to understand how this is possible under the conditions of its larval life. The first traces of the larva are always found *in the pith* of the stem or branch of the tree, about an inch from the base of the thorn. I have never been able to understand how the larva gets to the pith without leaving some trace of its path from the outside of the stem. The egg must be deposited on the outside of the stem, because the ovipositor of the ♀ is too soft to be able to penetrate the bark and wood to the pith. It would seem that the eggs of the little chalcid parasites must be deposited on the microscopic larva of the moth as soon as it emerges from the egg, and before it has eaten its way into the branch, because it is impossible to understand how it can be done afterwards, as these little parasites are themselves so small that two of them placed end to end would not extend from the outer surface of the bark of the twig to the central pith, and their ovipositors are very short and not exserted. By some means, however, they do manage to reach the larva, and frequently in place of the lepidopterous larva one finds only its shrivelled integument and a dozen or more minute chalcid pupæ, looking as if they were plaited together so as to form a chain as long as the larva of the moth. Sometimes, too, one finds the imagines which have not been able to effect their egress, however they may have effected their ingress to the thorn. There are two other species of Chalcididæ sometimes found in a similar predicament, dead in the prison in which they were hatched. One of these in the imago state is about two lines long. I do not know whether these feed on the larva of the *Laverna* or on one of the other larvæ above mentioned. The *Laverna* larva eats its way to the base of the nearest thorn, usually about an inch distant, then up through its pith a short distance, frequently turning off into the nearest branch. It eats through nearly to the outer surface, leaving only the thin cuticle of the thorn, reaching this point in May, the egg having been deposited on the twig about July or August of the previous year. Here it enters the pupa state, and in ten days or two weeks the imago makes its appearance, the empty pupa skin being left projecting from the little circular hole where it has burst through the cuticle of the thorn. The imago is almost unicolorous, but it ranges from deep glossy brown very faintly bronzed, to a bright bronze or almost golden brown.

Dr. Schweinfurth mentions (*Heart of Africa*, v. I, p. 98) and figures the thorns of an African Acacia which have a large swelling at the base

produced by some insect, with the little orifice from which it had emerged very much like that made by *Laverna gleditschiaeella* in the thorns of the Honey Locust. The *Laverna*, however, produces no swelling of the thorn. On a journey previous to that detailed in the *Heart of Africa*, Dr. S. had planted in Cairo seeds of an Acacia which he had gathered in equatorial Africa. On his later journey these seeds had produced trees which bore thorns in which were the same swellings and the hole by which the insect had emerged, and the Dr. suggests the query whether the insect had survived in the seed!! or "how did it contrive to get to its tree in Cairo?" The idea is novel enough that the insect was carried in the seed which survived its ravages, and in spite of them produced a tree, while the insect having been planted in the seed, managed to make its way through all the stages of the growth of the tree for so many years, and finally emerged from its thorn. As Dr. S. states that "it also occurred in several other situations" beside that at which he planted seed, a more reasonable theory is that the insect was there before he planted the seed. He does not inform us what sort of an insect it was. He mentions also a musical sound produced by the wind blowing into the holes in the thorns from which the insects had emerged. No sound, however, is produced by this cause in the thorns of the *Gleditschia*.

I have been informed that thorns of various species of Acacia (in a large sense) in Texas, New Mexico and Arizona are perforated by insect borings similar to those of *Laverna gleditschiaeella* in the Honey Locust, but I have not been able to procure specimens of the insect architect. Prof. Sumichrast mentions similar borings in Acacias in Mexico (referred to in a volume of the *American Naturalist*—I write from recollection and cannot refer to the volume or page). These, however, like those of which Mr. Belt gives such an entertaining account in "The Naturalist in Nicaragua," were tenanted by ants, and according to Mr. Belt, the excavations in the Nicaragua Acacias were made by the ants, which in return for the home and shelter afforded by the thorns, furnished a standing army for the tree, protecting it from depredations by other animals. Two species of ants—a *Myrmica* very near *M. molesta* Say, and a *Formica* (*F. dislocata*? Say) also inhabit the thorns of *Gleditschia triacanthos*; but I have not been able to learn that they render any sort of service to the tree, and certainly they do not excavate their own dwellings, but only appropriate dead thorns that have already been excavated by the larva referred to in the preceding pages—just as they might take advantage

of any other crevice or opening which promised the requisite shelter. The colonies of the *Formica* are much more numerous than those of the *Myrmica*, and the species varies so in color—from those in which the workers are of a dull dead black to those in which the thorax is of a honey yellow—that I at first thought there were three species. I became convinced, however, that there is but the one species. Each formicarium contained one ♀ and a number of larvæ, while the number of workers in some was less than a dozen; in others it rose to more than a hundred.

ON THE GENERA NOLA AND ARGYROPHYES.

BY A. R. GROTE,

Director of the Museum, Buffalo Society Natural Sciences.

I have received from Canada (London, Mr. Saunders) a new and easily recognizable species of *Nola*, larger than *ovilla*, and in describing it, I have again gone over the characters of *Argyrophyes*, which I find to be allied to *Nola*, and not to belong to the *Geometridæ*. I have corrected my former observations on *Argyrophyes*, which I find to have been largely erroneous.

Nola sexmaculata, n. s.

♂ ♀. Fore wings with the apices produced, gray, like *ovilla* in color, crossed by three oblique dentate and very fine black lines. Costa at base marked with brown. Immediately beyond, at basal third, is a second brown mark, widening inferiorly on the cell. A third and larger, subquadrate, at the middle of the wing. These two last spots are seen to be very finely edged with white on the outside. Hind wings gray with white fringes and discal dot. Beneath sub-irrorate, fore wings gray, hind wings white with discal dot. *Expanse* 19 mil. Two specimens; in the male the antennæ are broken off; from what remains they do not appear to have been pectinate.

Argyrophyes Grote (Bull. B. S. N. S., 1, Plate v.)

The enlarged figures of the neurulation (3, 2) I have given are incorrect and may mislead. I have made a fresh preparation of the wings according to Mr. Dimmock's method. The primaries are like Zeller's figure of *Nola confusalis* (fig. 43, a) except that the base of 6 is opposite 5 from the cross vein, as I have figured it. My diagnosis is correct except that for "9 from upper and outer angle of the cell to costa" it should read "just before the upper, etc.," and here my figure and description, which agree, are both wrong. Also 7 touches the costa just before the apex, not at apex. The hind wings differ from Zeller's fig. b, and agree with mine in that vein 4 is joined at right angles by a true vein to vein 3, and is nearer 3 than 6, as I have drawn it. My vein 4 is probably vein 5 of Heineman (1, 273). There is also one accessory internal vein on hind wings. I have referred the single species to the *Geometridæ*, but it should be evidently placed near *Roeselia* among the Lithosians. The neurulation is so very variable among the European species that it might not be held generically distinct, but vein 5 is not thrown off from the middle of the cross-vein as given by Heineman for *Roeselia*, but is nearer 3 (4 wanting) than it is 6, and joined by a true transverse vein to the submedian, which is thus 3-branched, not as Zeller figures *confusalis*, 2-branched with 5 independent from the middle of the cell without a true connection with the submedian vein itself. I cannot now account for my errors in drawing the enlarged figures of *Argyrophyes*, except that the wings, which are very frail, were insufficiently cleared of scales, preventing me from getting an accurate view of the venation. The diagnosis given by me (l. c. 175) should be amended to read as follows :

Argyrophyes, n. g.

Ocelli wanting. Maxillæ short, concealed by the prominently long, very thickly scaled palpi, which exceed the front, their third article directed forwards. Wings full; primaries large with evenly arcuate costa, straight external, and consequently long internal margin; 10-veined; cell long, incompletely closed; 2 to 5 at decreasing intervals; 5 from the cross-vein near 4; 6 from the cross-vein near 4 and opposite 5; between 5 and 6 the cell is incompletely closed by an angulated fold; 7 to costa just behind apex; 8 out of 7 to costa; 9 just before the upper and outer angle of the cell to costa; 10 and 11 wanting. Hind wings rounded, 7-veined; cell incompletely closed; two internal veins counted as one;

median 3-branched; vein 4 wanting; 5 joined to median at right angles from a true vein, the commencement of the cross-vein; 6 and 7 together from a point beyond the closure of the cell; 8 out of 7 near the base. ♂ antennæ simple, scaled, ciliate beneath.

Argyrophyes cilicoides is chalk white; the basal half of primaries white; on the outer half of the wing the terminal portion of the median space is shaded with smoky, enclosing a raised blotch of black metallic scales at the extremity of cell. A waved smoky subterminal line dividing the white terminal field and very near the margin. Beneath the primaries are smoky except along internal margin at base. Hind wings white with a smoky shading within the fringes; beneath with a faint dot. Body white. *Expanse* 16 m. m. New Jersey. I find that my two specimens were males.

Very near to *cilicoides* is *Nola nigrofasciata* of Zeller, Taf. 2, fig. 1, but it is impossible that it is the same. The color of the band is "brown" and it occupies the middle of the wing, and is well defined in Zeller's figure. In *cilicoides* there is no middle band or median space, but the smoky shading is limited to the outer part of the median space without the usual place for the median shade line. The narrow exterior line is evenly arcuate to submedian fold. The white terminal fields are narrower than in *nigrofasciata*.

But I have a species received from Mr. Goodell, Amherst, Mass., the specimen numbered 602, which closely agrees with Zeller's figure and description except that it is a little larger (19 mil.). The median band is not quite separated at its submedian constriction, but this is an ordinary varietal character. Else it agrees perfectly. There is the dot on median vein at base and costal shade (entirely wanting in *cilicoides*), and the faint mark before the inception of the subterminal line. No doubt can remain on my mind that I have Zeller's species before me. Now this species has been evidently re-described by Mr. Morrison, Boston Proc., 154, 1874, as *Eustrotia obaurata*! But the palpi are the palpi of *Nola* and not of *Eustrotia*. They are rather the palpi of *Argyrophyes*, being longer than in *Nola* and with a more pronounced upward curve. The vestiture is wholly scaley and not like that of *Eustrotia*. And the ocelli are wanting. All doubt fades when we come to examine the neuration. *It agrees precisely with Argyrophyes*, and just in those points, accordingly, where *cilicoides* differs from *centonalis*. The median vein of secondaries is 3-branched, vein 4 wanting, vein 5 joined at right angles by a true vein

and nearer 3 than 6; vein 8 is thrown off near the base of the wing. A second species of the genus *Argyrophyes* will then be:

Argyrophyes nigrofasciata Zeller, Beitr., 1, 8, Tab. 11, fig. 1 (*Nola*), 1872.

Eustrotia obaurata Morr., Proc. Bost. Soc. N. H., 154, 1874.

My specimen is a female. Zeller describes and figures the male, which seems to differ unimportantly.

We have here two white species which seem to differ from all known species of the group in the squarer primaries, longer palpi, more rounded secondaries, and in the details of the venation. The ornamentation is remarkable for the metallic scales accompanying the discal spots.

In a forthcoming paper I hope to be able to give corrected drawings of the venation of *Argyrophyes*.

In describing *obaurata* Mr. Morrison does not mention the black dot at base of primaries, and he calls the median space "blackish gray"; Zeller calls it "brown." In the specimen before me it seems to have an olive cast; it would be described as "obscure olive-brown." The scattered metallic scales are very obvious. In Mr. Morrison's description I find no mention of the ante-marginal shade line. But the rest of the description is accurate, and I recognized this species from it in Mr. von Meske's collection at Albany.

ENTOMOLOGICAL PINS SEIZED FOR DUTIES.

For some years past our Society has kept a small stock of Entomological pins, not for the purpose of gain, but for the convenience of our members, many of whom, in the United States as well as in Canada, have obtained their supplies from us in small packages transmitted through the mail. Recently the custom house officer at Detroit seized several packages of these pins, and demanded for their release charges amounting to more than their value. This action, it appears, was prompted by a special circular from the Treasury Department at Washington to the collectors, requiring increased vigilance in regard to packages transmitted by mail—to prevent loss of revenue to the Department.

On being informed of the seizures, we wrote to the Secretary of the Treasury, explaining the objects of our Society in this matter, referring to past usage and also to the fact that these pins were only used for scientific purposes. In reply the Secretary holds that Entomological pins must take their place alongside of other pins and pay a duty of 35 per cent., and that the transmission of such packages by mail is contrary to law. At the same time he kindly instructed the collector at Detroit to waive the usual charges on seized goods and deliver the pins in his possession on payment of duties only. We shall hence in future be prevented from supplying our members in the U. S. with pins by parcel post.

On enquiring from the collector as to whether small quantities of pins might be sent by letter postage, we received in reply a copy of the circular sent from the Treasury Department. As this circular speaks only of *packages*, we presume that pins in small quantities enclosed in letters, covered by the usual letter postage, will not be interfered with.

Sheet cork, which is liable to a duty of 30 per cent., will also, we understand, be subject to seizure, but since the packages we send seldom exceed fifty cents in value, we do not know whether they would be regarded as of sufficient importance to warrant the trouble of the correspondence attending such seizures. On this point we have applied for information, but have failed to obtain it. Any packages of this sort sent in future will be at the risk of the parties ordering them. Either pins or cork can be safely sent in any quantities by express, subject to the duties mentioned.

CORRESPONDENCE.

CATOCALA MARMORATA.

Catocala marmorata may now safely be put down as one of the regularly settled species of this locality. An intimate friend and fellow hunter, in company with myself, took five examples this season, which, with four I took last year, makes nine in all, which is a pretty good showing for a single locality of an insect which, though seemingly diffused over a large territory, is nevertheless one of the rarest of the genus it so royally represents. Mr. Charles Dury, who took one last year, reports another

this year at Cincinnati; and Mr. Geo. W. Peck took one this season in New Jersey. This makes twelve in all that have been taken in the United States, besides the original one in the Collection of the Entomological Society of Philadelphia, that I am aware of. If others have taken it in other localities, I hope they will report. Some who have not seen the examples taken here and elsewhere, have hesitated to believe that they were the true *marmorata* of Edwards, but a glance at them is enough to convince any one of their identity. I have not seen the original type, but our examples tally exactly with the published description. It is a large, showy and uniformly defined species, entirely distinct, and cannot well be mistaken for or confounded with any other species.

JAMES ANGUS, West Farms, N. Y.

SPHINGIDÆ AT SUGAR.

I have taken the following *Sphingidæ* at sugar at Center, this season :

<i>Sphinx choerilus</i> .	<i>Sphinx myron</i> .
" <i>kalmiæ</i> .	" <i>sordida</i> .
" <i>gordius</i> .	" <i>cinerea</i> .
" <i>hyla</i> us.	" <i>Harrisii</i> .
" <i>Abbotti</i> .	" <i>lineata</i> .
" <i>drupiferarum</i> .	" <i>luscitiosa</i> .

JAMES S. BAILEY, M. D., Albany, N. Y.

DONATION TO ENTOMOLOGICAL SOCIETY OF ONTARIO.—We tender our sincere thanks to our esteemed correspondent, Mr. V. T. Chambers, of Covington, Ky., for a collection of named Micro-Ledidoptera kindly presented to our Society. This collection, which reached us in very fair order, consists of 66 species, and is a most welcome and valuable addition to the Society's cabinet.

The Locust Plague in the United States, by C. V. Riley, M. A., Ph. D.

This is an octavo volume of 236 pages, with 45 illustrations, including several maps; published by Rand, McNally & Co., Chicago. It is handsomely got up and contains much valuable information on this important subject; it is, in fact, a digest or reproduction in a compact form of the material contained in the author's several valuable reports on this insect to the Legislature of the State of Missouri. Price, in paper, \$1; cloth, \$1.25. Sent by mail by the publishers, prepaid, on receipt of price.

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NOTES ON LYCAENA PSEUDARGIOLUS AND ITS LARVAL HISTORY.

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On one of the last days of June, 1877, I observed a female *pseudargiolus* hovering about a flower-stalk of *Cimicifuga racemosa*, and it occurred to me that here might be the food plant of the summer brood of this butterfly, which I had for years been in search of. And thereupon I captured this female and confined her in a muslin bag upon one of the stalks. Two days after I found several eggs and also young larvæ, which last must have come from eggs laid some days before. This led me to examine other stalks, and I found quite a large number of both eggs and larvæ. The plant is called hereabouts "rattle-weed," and grows abundantly in the edges of the woods throughout this region. It sends up a stalk, sometimes branching, four or five feet, terminating in a spike or spikes, six to ten inches long, of round, greenish-white buds, which stand upon short stems and are arranged in rows about the stalk, diminishing in size till they reach the pointed top. The lower buds, when about the size of a pea, open first, and the flowering proceeds gradually up the spike, so that buds are found through a period of from four to six weeks. The flowers exhale an intensely sweet odor. The larva of *pseudargiolus*, during its younger stages, is white and so near the color of these buds that they are well protected and difficult to find. In the later stages it may be white or greenish, and often there are a few black or brown patches irregularly scattered over the surface. When mature it is one-half inch long, and is onisciform, like all Lycaenid larvæ. The head is very small and is placed on the end of a long green neck, which, at the junction, is of the diameter of the head, but gradually enlarges and seems to be fixed at the extreme hinder part of the next (or second) segment, which segment is hollowed out to form a sheath for it. In the last larval stages the top of this segment is elevated and transversely compressed, and leans forward, shielding

the head as the larva moves about. When at rest the neck and head are wholly withdrawn, and as the former, when fully extended, is considerably longer than the depth of the second segment, it must possess much elasticity.* The larva feeds on the inner part of the bud, and to get at this cuts away the surface on one side till a hole is made just big enough to admit its head; and as it feeds the second segment is pressed hard against the bud so as to permit the utmost elongation of the neck. Thus it is enabled to eat out the contents of the bud, and only desists when there remains but the empty shell. When so engaged the anterior segments are curved up and the others rest on the stalk of the plant. But very small larvæ rest wholly on the bud, curving about it. I have not seen

* NOTE.—In a recent paper by Mr. Scudder, "On the Classification of Butterflies with special reference to the position of the Equites or Swallowtails," Trans. Am. Ent. Soc., vi., 69, 1877, the special object of which is to argue for the degradation of the Papilioninæ, I find the following lines: "The Equites and Ephori" (by this last obsolete appellation the uninitiated may understand some division which includes the Lycaenidæ). . . . "are closely related to each other and disagree with all other groups in the retractility of the head of the caterpillar." This sweeping assertion is fortified by a quotation thus: "I do not know that attention has ever been drawn to this feature in the caterpillars of Equites since the time of Denis and Schiffermuller, who say, Syst. Verz. Schmett. Wien., 161, 1775, 'When at rest the head is nearly half concealed by the extended epidermis of the first body segment, and can be compared with nothing in other butterfly caterpillars, excepting the complete retractility of the head in Lycaenids.'" I observe that the authors quoted by Mr. Scudder do not say that the head is retractile, but that it lies "nearly half concealed by the extended epidermis of the next segment." There is nothing that can properly be called retractility of the head in any *Papilio* larva ever bred by me, and this will cover *ajax*, *troilus*, *asterias*, *turnus*, *cresphontes* and *philenor*. The head of *Lycaena* pushes out like the upper joint of a microscope and it is as completely retractile as the head of a turtle. The head of *Papilio* is partly covered by the extended epidermis of the next segment, which forms a sort of collar, and this segment is unusually broad as compared with larvæ of other families, probably in order to afford room for the tentacles and muscular apparatus connected with them. As the larva feeds, the head has a vertical movement, and when the jaws are raised, the top of the head is turned down a little into the collar. But as to any ability in *Papilio* to push out and draw in its head beyond that of any species of the Nymphalidæ, for example, it does not exist. A caterpillar of *Argynnis* will rest on its hinder legs and extend its body fifty per cent. beyond the length it assumes when at rest, and unless its joints were cast iron, some power of extension must belong to every jointed creature; and the neck of the caterpillar, which is nothing but the connection between the first and second segments, stretches just as the rest of its body stretches, perhaps a little more, but in no different manner. That is another thing from "retractility." One might as well say that a man's head is retractile when he wears a high shirt collar.

one of the larvæ on this plant eating an opened flower, but they destroy the buds extensively, and on examining any of the spikes many buds will be found drilled, though often no larva is seen upon it. This disappearance of the larva I attribute principally to spiders, as I found many of them on the plants.

I very soon noticed that ants also frequented the spikes and supposed that the honey-sweet flowers drew them, but presently saw an ant running up and down the back of one of the larvæ, drumming and gesticulating with its antennæ, and was surprised to find that the larva, though feeding, did not seem in the least disturbed at the treatment, neither withdrawing its head from the bud nor wincing in the body. It evidently knew well who was treating it so familiarly. Had it been touched by an ichneumon fly or had such an insect approached it nearly without touching, it would have displayed alarm instantly. A little farther search showed other ants, and sometimes several of them, busy about other larvæ, running from one to another on different parts of the spike and always repeating the same drumming motions, stopping often to lick the surface, as it seemed to me, and the presence of ants became a sure indication of larvæ and saved me much trouble in searching for the latter.

The next day I went to the wood with my hand glass and watched for a long time to see what the ants sought. The first day I had seen two species of ants engaged, each of medium size, but I now found a third and very small species operating in the same manner, and in one case six of these were busy over one larva. But the movements of all the species were similar. They ran up and down and across the bodies of the larvæ, working their antennæ violently, keeping their mandibles close to the surface, which they often stopped for an instant to lick. The whole upper side of this larva is covered with little glassy stellar processes, five or six rayed, scarcely raised, and from the centre of each springs a short filamentous spine. Where the surface is white these processes are white, but on the dark spots they are dark, and on these last they seemed to be less regularly stellate. The ants attended most diligently to the last two or three segments, and especially to the back of the 11th, but they certainly licked the surface at the junction of these segments and elsewhere along the body towards the head. I thought there might be some exudation from the surface, and perhaps from the stellar processes, as I saw no special organs for excreting.

Some of these larvae I sent to Mr. Lintner, at Albany, N. Y., asking

him to subject them to a more powerful glass than any I had, and give me the result. He presently (10th July) wrote: "Mr. Peck and myself have both carefully examined the larvae for the gland which you thought might exist on the abdomen (11th segment), but we find none. . . But why did you not speak of the two processes near the hind end of the body and suggest that these might be secretory organs? If the ants really obtain some sweet matter from the larvæ, then these are the organs through which it is emitted. They could hardly have escaped your notice, as they are visible to the naked eye, and distinctly under the magnifier. They are two short cylindrical projections, of perhaps twice the length of their diameter, giving out at their tops twenty or more barbed hairs. I could not determine whether these hairs covered the entire top, but I rather thought that they proceeded from a fissure extending across it, which perhaps could be dilated or contracted at will."

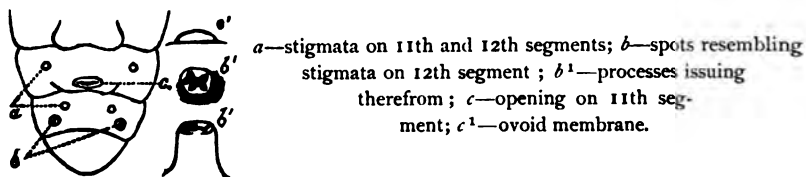
On reading this I at once made an excursion for more larvæ (now 13th July, and the flowers fast disappearing), and was fortunate in finding half a dozen. I also captured two of the ants and confined them with larvæ in a glass; so kept them for two days, examining them repeatedly. The ants were not restive under confinement, but devoted themselves to the larvae, being almost all this time near them, going from one to another, at intervals operating after the manner before described. But at the end of the second day, getting impatient at the decrease or withholding of the object they sought, and making no allowance for the deficient food and untoward circumstances of the larvae, they began viciously to bite and mangle them, and I was forced to conclude my observations and save any unhurt subjects in alcohol. All this time I was unable to discover the organs to which Mr. Lintner had called my attention. I was more certain, however, that whatever the ants were after came from the last three segments, and they constantly returned to the 11th. I had to regret that my attention had not been called to the whole matter a few weeks earlier.

But I sent one of the larvae obtained 13th inst. to Mr. Lintner, and he wrote me thus on the 16th: "The larva came safely, but has since died from want of proper food. We could not find the organs on it of which I wrote you. They were not visible. After its death I discovered one, and by means of pressure disclosed the other. In the latter the armature of hairs was not thrown out, but I could discover them within the organ. I think they will prove to be excretive."

I had a large number of chrysalids from the larvae obtained, and at intervals a single butterfly would emerge. Thus one male 19th Aug., after about thirty days in chrysalis. Sept. 1st, one male; and during my absence from home, some time between 3rd Sept. and 20th, one female emerged, and these were all. The other chrysalids will give butterflies next spring. During the period between the forming of the chrysalids and 1st September I occasionally saw a few examples of the butterfly on the wing, one here and one there, but there certainly was no regular brood subsequent to July. And all the butterflies seen were smaller than those of June, and corresponded in this respect with those that emerged in my boxes. Such of the females as appeared in September were just in time for the fall food plant of the species, *Actinomeris squarrosa*, which begins to bloom then. I have formerly related the discovery of the larvae of *pseudargiolus* on the flower heads of this plant by Mr. T. L. Mead, and that the butterflies which emerged in the spring from the chrysalids of *pseudargiolus* were proved to be *violacea*; CAN. ENT. vii., p. 81. This fall I was absent till 20th Sept., and until the few plants of *Actinomeris squarrosa* known to me and near at hand were nearly or quite out of bloom, and I failed to find any of the larvae. It is true that in confinement they will eat the flowers of *Actinomeris helianthoides*, an excessively common plant here, but it would be useless to search on this for the larvae because it is so common, and I am confident they always prefer the other when to be had. But 12th October I chanced to be some miles away from home and to find on the edge of a corn-field several plants of *squarrosa* in full bloom. These I examined one by one till I found twelve larvae in various stages up to last. It is worth notice that whereas the summer larvae, feeding on *Cimicifuga*, are white and of the color of their food, in the fall, feeding on a yellow flower, they are dusky and green. I watched carefully for ants and presently had the satisfaction of seeing one come across the flower head to one of the largest larvae. It manipulated it for a moment and then departed, and seemed to me to have expected something from the larva and to have gone off disappointed. This *Actinomeris* is as bitter as the summer plant is sweet, and it is less likely that the larvae living on such food would exude or secrete saccharine matter than in the other case. I immediately sent the largest larva to Dr. Hagen, and in due time received a card with his reply: "Dr. Mack found directly three secretory organs." The next day a letter, thus: "I have examined carefully your larvæ, and some in alcohol of *Lycæna argus* and *corydon*. All

have the organs alike. On the penultimate segment you find outside and behind the stigmata two large white spots, each one of which evaginates a white membranous tube, just like the finger of a glove, the top of which is not entirely drawn out. I have seen the tube frequently, and if I blow a little the tube is invaginated instantly. On the antepenultimate segment is a larger and transversal opening behind and between the stigmata near the apical border. It looks like a closed mouth with its lips, but I have not seen anything protruding from it. But in an alcoholic larva of *argus* I saw an ovoid evagination." Recently I sent Dr. Hagen mature larvæ of *comyntas* in alcohol, and he writes: "I was able to ascertain exactly the same parts and in same situations as in *pseudargiolus*."* Dr. Hagen also referred me to a paper by M. Gueneé, Ann. Soc. Ent. de France, ser. iv., vol. 7, 1867, pp. 696-7, and plate 13, in which are described and figured similar organs in *Lyc. baetica*. Gueneé relates that while observing the larva of *baetica*, he noticed two openings altogether like those of the stigmata and nearly of same size. At first he thought they were superfluous stigmata, and puzzled himself with conjecturing the object of them; but as he turned the caterpillar about in order to see the partings of these openings which seemed to be different from the stigmata, the larva, which this handling disturbed, suddenly made to leap out of these holes a peculiar body which he cannot compare to anything better than to the tentacles which certain polypi put forth at will. "This is a soft, cylindrical organ, the extremity of which is furnished with little fleshy points resembling hairs, some standing upright, some radiating from a point on the summit. This singular object placed under the highest power of the microscope, these apparent hairs are seen to be long tentacles and themselves bristle with fleshy spines. Those at the circumference

* The accompanying figure represents the last segments of *pseudargiolus* larva, and the position of these organs :



The processes b¹ are but partly protruded and as Dr. Mack saw them.

are pretty regularly arranged, and sometimes lie flat on the cylinder (probably when they have just emerged from the opening, or are about to return), sometimes stand out in a threatening manner. But it is on the summit that these tentacles are most numerous, piled up, lying one upon another and in all directions, so that it is impossible to count them. The caterpillar has the power of protruding these organs at its will, either one alone or both together. It throws them out like the tentacles of *Papilio* or the horns of snails. Sometimes it shows but half their length, and then the tentacles expand but little or none at all; sometimes it projects them fully, making the tentacles radiate in all directions. Most often it allows itself to be handled, tickled, pricked, without exposing them, which seems to exclude the idea that these organs are means of defence or of intimidation. . . . The observer will readily cause them to appear by pressing the larva from head to anus.

"But this is not all, and our caterpillar presents another singularity. At the summit of the 10th segment" (*i. e.*, 11th, counting the head as first) "is found still another opening, this time unique, placed transversely and surrounded by a raised pad, about which the granulations which cover the body of the caterpillar become particularly dense. From the middle of this opening (*boutonnière*, button-hole), comes forth, at the will of the caterpillar, a sort of transparent, hemispherical vesicle, which gives escape to a fluid sufficiently abundant to form a good sized drop, which reproduces itself when it is absorbed. The caterpillar only secretes this fluid when it is disturbed, imitating in this respect *cucullia* and many other larvae which disgorge by the mouth a colored fluid, doubtless with the intention of driving away their enemies. As to the end which nature proposes by this exceptional structure, it is not easy to divine it. The explanations which one has imagined in some analogous circumstances appear to me too forced that I should expose myself in risking new ones." The figures illustrating this description represent a cylindrical tube, bulbous toward the summit, and bristling with feathery-looking tentacles. This corresponds with Mr. Lintner's description of "barbed spines," and with a pen and ink sketch which he also sent me. But he represented the tube as wholly cylindrical, not at all bulbous, and there is probably a specific difference in this respect.

I learned from Mr. E. T. Cresson, to whom I had mentioned the facts observed in June, that Rev. H. C. McCook, of Philadelphia, had seen something of the same nature, and I wrote Mr. McCook to inquire. He

replied that he saw, last spring, a small green larva on the blossoms of *Cimicifuga racemosa* and a black ant attending it. "The ant directed strokes of its antennae upon the tail of the larva incessantly; larva moved a little; ant ran up and down and up other stems and returned; strokes renewed upon the tail; larva moves its head; strokes directed toward the head; larva moves round the stem; ant off, and in a moment returns, with strokes." He observed this proceeding from 10 a. m. to 12 m., and adds: "I am at a loss to explain these strange manipulations. My first idea was that the ant was seeking to tempt the larva to loosen its hold upon the plant and then seize it for food. But I soon found that the purpose was at least friendly." The plant, it will be noticed, is the same as that fed on by *pseudargiolus* in Virginia.

It is clear, therefore, that the larvae of several species of *Lycæna* have one or more special excreting organs, and that one species at least is regularly attended by formicidians for the sake of the excreted fluid. And it is probable that the quantity of this and perhaps its attractiveness depends on the nature of the food plant. Also that all the organs are generally concealed. I was not able to distinguish them upon any living larva even after my attention was called to them, though I saw the mark on 11th segment, which proved to be one of the openings. I took those on 12th segment for stigmata, which they resembled. But in one larva now in alcohol I find the two tubes partly protruding and easily to be seen with the naked eye. And as the ants were eagerly licking the surface in the vicinity of these organs, as well as just at them, the fluid may escape without their protrusion and overflow the surface. That either of these organs is used for defence is not shown by any evidence, and, as M. Gueneé intimates, the probability is all the other way. The secretion is attractive, not repulsive like that which poisons the air from the tentacles by the head of *Papilio*.* Whether

* In the paper "On the Classification," &c., Mr. Scudder supports his argument for degradation of *Papilio* by this discovery of M. Gueneé. Mr. Wallace had claimed, and properly, that the possession of such a peculiar structure as the scent organ of *Papilio* larva, with tentacle, muscular apparatus, &c., for frightening away its enemies, is a mark of high development, and that its presence in one group and absence in every other is a proof of a very ancient origin and of very long-continued modification, Nat. Select. Am. Ed., 135. Mr. Scudder thus disposes of the whole matter: "*Extensive fleshy organs* do occur in other groups. Gueneé discovered them *on the abdominal segments of certain blues*," &c. . . . "yet nobody on that account claims for them a high rank."

the secretion is confined to the opening on 11th segment, or is also given by the tubes on 12th, remains to be determined by farther observations.

I find no mention in any author accessible to me of ants attending lepidopterous larvae. Kirby & Spence (Longman, 1856), p. 336, say: "Not only the Aphides yield this repast to the ants, but also the Cocci, with whom they have recourse to similar manœuvres and with equal success; only in this case the movement of the antennae over their body may be compared to the thrill of the finger over the keys of a piano-forte." (This describes well the movements over our larva.) "Even beetles are occasionally made cows of by *Formica flava*, which keeps in its nest *Claviger faveolatus*, and obtains from the bristles terminating its elytra a gummy secretion which it uses for food," &c. And Mr. Belt, "Naturalist in Nicaragua," p. 227, describes the attending of larvae of leaf-hoppers by ants, but even this careful observer does not seem to have noticed the ants with lepidopterous larvæ.

The history of *pseudargiolus* in Virginia is this: In the early spring *violacea* appears, a very distinct form, and characterized by dimorphism in the female, some of that sex being blue, others black. The eggs laid by *violacea* give larvæ from which comes *pseudargiolus* last of May, but the food plant of such larvæ is not yet known—possibly *Cornus*. The female *pseudargiolus* lays eggs on *Cimicifuga racemosa*, and most of the resulting butterflies over-winter, to produce perhaps *violacea*, but also perhaps the typical *pseudargiolus* again (which of the two I hope to ascertain by March, 1878). But a small percentage, say five, of these chrysalids give butterflies at irregular intervals during the same year, at least as late as September, and the earliest of these, if I may judge by what I have seen in the field as well as by the results in my boxes this summer, are males, the females mostly if not wholly emerging latest. These butterflies are always smaller than the parents (the typical *pseudargiolus*), some not much, however, but nearly all considerably, and these last are nothing more nor less than what I named, described and figured (But. N. A., I, pl. 50) as *neglecta*. I cannot see any distinction between them and examples of *neglecta* from New York. Besides the difference in size there is usually but not always some in the shade of upper surface between these and *pseudargiolus*, and on the under side the marginal crescents and discal spots are usually but not always more decided than in the latter. The intermediate examples may be called small *pseudargiolus* or large *neglecta*. There is no regular second summer brood—that is, there are

but two regular annual broods of this species, the *violacea* of March and *pseudargiolus* of May. The individuals which chance to emerge in July, August and September are *neglecta*, and irregular. But their females lay eggs upon *Actinomeris squarrosa*, and the chrysalids then resulting give *violacea* the next spring. That is a peculiar history, and I know no other which runs parallel with it. In the case of *L. comyntas*, one brood succeeds another all the season and there are four or five of them here. And I have found none of the early chrysalids to over-winter. The chrysalis period in *comyntas* is very short, about eight days, whereas it is from thirty to sixty in case of *pseudargiolus* where the butterflies emerge the same season.*

The typical *pseudargiolus* is also found in Pennsylvania, but *neglecta* is most common there, and farther north to Canada, except in rare instances, this last is the only one. Mr. Scudder, in the paper referred to, ENT., viii., gives the history of *neglecta* in N. England, and it corresponds curiously with the history of *pseudargiolus* which I have related, though he derived it almost if not quite altogether from field observation of the butterfly: "The eggs are probably laid in the middle and latter end of June and most of the caterpillars become full grown in the early part of July; how long a time is passed in the chrysalis is unknown, but the earliest butterflies of the second brood appear about the first of July, and continue to emerge until the first of August . . . and in spite of their great delicacy these insects may still be seen in September; . . . probably the eggs are laid in August, the caterpillars attaining their growth in the latter part of September, and transforming to chrysalids before winter." I have no doubt this conjectural account is in the main a correct one, or in other words, that *neglecta* behaves at the north just as its other form and other self does here.

And I fully believe that *lucia* is nothing but a northern spring form of the same species—that is, it either occupies the place of *violacea* in some, or is a co-form with it in many, localities. I suggested the relation-

* Mr. Scudder, CAN. ENT., viii., 64, says: "Mr. Abbot, in Georgia, years ago raised *pseudargiolus* (or what he called *argiolus*) in March from caterpillars which went into chrysalis the last of April of the preceding year." I do not know where Mr. Scudder learned this, for it is not so stated in the *Insects of Georgia*. The text says that the caterpillar was found, and "the first change (*i. e.*, to chrysalis) took place on the 16th of June and the fly appeared nine days afterward."

ship between *lucia* and *neglecta* in my paper first referred to, ENT., vii., 82, and Mr. Scudder made the matter more probable by his relation of the history of these two forms or species, ENT., viii., 64, considering it possible that *lucia* was a boreal and colline form of *violacea*, but appearing a little earlier in the season. I have undoubted *lucia* in company with *violacea* from Anticosti; in same way, both forms from Maine; also from New York, and *lucia* grades into *violacea* unquestionably. From Colorado I have *lucia*, *violacea* and *neglecta*. In the account given in But. N. A. of *neglecta*, I find a statement which was not explainable at that time, but which the observations of this year make clear, namely, that "in June, 1866, at Coalburgh, *neglecta* appeared in large numbers, while I scarcely saw a dozen *pseudargiolus*, usually so abundant. In the following years (1867-1868) *neglecta* has again been rare in this district." Plainly enough, owing to insufficient food for the larvæ sprung from eggs of *violacea*, caused by an unpropitious spring, the butterflies were reduced in size, and while I could find few *pseudargiolus*, everywhere *neglecta* had taken its place. Being one and the same species, that is exactly what would occasionally take place, and it is to abundant food on the other hand and unusually favorable larval conditions that here and there to the northward a few typical *pseudargiolus* appear when all the others flying are *neglecta*. Now after writing these last lines, it occurred to me to look up my journals for 1866. I find therein that the season was late, the first examples of *violacea* being seen April 1st, whereas in other years I had found them from 10th to 15th March. On 4th April the mercury reached 90° and *violacea* is recorded as abundant. Immediately after which followed cold and wet (always disastrous to butterflies after extreme heat, which has caused them to emerge from chrysalis prematurely), and this bad weather lasted through April and most of May. Up to 10th June all butterflies are mentioned as being very scarce (because the early brood had been more or less destroyed by the cold). On 16th June, and again 28th June, I record that not a *pseudargiolus* had so far been seen that year, but that all which had appeared were *neglecta*. How, two years after, I came to state that a dozen *pseudargiolus* had been seen in 1866 I cannot now remember, but probably I then concluded that the larger and paler examples of what I first called *neglecta* were properly small *pseudargiolus*.

DESCRIPTION OF THE PREPARATORY STAGES OF *L. PSEUDARGIOLUS*.

EGG—Diameter, .02 inch; round, flat at base, flattened at top, the

micropyle depressed ; color delicate green, the surface covered with a white lace-work, the meshes mostly rectangular, with raised points at the angles. Duration of this stage 4 days.

YOUNG LARVA—Length, .04 inch ; onisciform, sub-cylindrical, flat beneath with retractile legs ; the dorsum high, rounded, smooth, shining ; color, pale greenish-white ; on either side of the medio-dorsal line a row of white clubbed hairs, one at the posterior end of each segment ; other similar hairs about base of body ; head very small, obovoid, black, retractile.

AFTER FIRST MOULT—Length, .1 inch ; nearly same shape, the dorsum sloping posteriorly from 4th segment ; the sides sloping ; the segments distinctly separated, rounded ; color, yellow-white or buff ; surface pubescent ; head as before.

AFTER SECOND MOULT—Length, .14 inch ; sub-cylindrical ; thickest at 2nd and 3rd segments, the dorsum sloping posteriorly ; segments well separated, rounded, the anterior edge of each on dorsum a little depressed ; the 2nd broadened at top and covering the head ; color yellow-white or buff ; surface velvety, with a few recurved hairs along dorsum, others straight at base of body ; the anterior edge of 2nd segment on dorsum fringed with rather longer and straight bristles.

AFTER THIRD MOULT—Length, .25 inch ; flattened at base, the dorsum elevated into a rounded ridge, sloping posteriorly ; the last segments flattened and 13 terminating roundly ; the sides excavated ; the 2nd segment compressed transversely, arched at top, bent forward ; color variable, some examples greenish-white, some sordid buff ; on middle of dorsum a dark vascular line ; the dorsum from 3 to 11 pale, and occupied by a series of sagittate spots, each truncated at the next segment ; the whole surface velvety ; head obovoid, dark brown.

AFTER FOURTH AND LAST MOULT—Length, .36 inch.

MATURE LARVA—Length, .5 inch. Nearly as at preceding stage ; onisciform, flattened at base ; the legs retractile ; the dorsum elevated into a rounded ridge which slopes back from 6th segment ; the sides deeply excavated, and on middle of each segment from 3 to 11 a vertical narrow depression ; the last segments flattened, the last of all terminating roundly, its sides narrowed and a little incurved ; the 2nd segment flattened, arched, bent nearly flat over the head ; the dorsal ridge is of a tubercular nature, standing on the body, and on each segment from 3 to

11 this ridge is distinct, cleft to the body ; color variable, some examples being white, some decidedly greenish ; many have the posterior slope of the 2nd segment black or dark brown ; some also have most of the dorsum dark brown, irregularly mottling the light ground ; some have only small brown patches disposed without rule on the dorsum, and mostly on the anterior segments ; the whole surface velvety ; this appearance is caused by minute stellate glossy processes, scarcely raised above the surface, only visible under a magnifier, mostly six-rayed, and sending from the centre a concolored filamentous spine a little longer than the rays ; these stars are arranged in pretty regular rows, and are light except on the brown patches—there both star and spine is brown ; on the 11th segment, near posterior edge of dorsum, is a transverse slit, in a sub-ovoid spot, from which proceeds an ovoid membranous process ; and on 12, back of and between the stigmata, on either side is a mark like a stigma, but a little larger, from which proceeds a membranous tube, in form of a truncated cone, ending in a crown of feathery tentacles ; these three special organs are exposed or concealed at the will of the larva ; (similar openings are found in the two preceding stages of the larva, but less easily seen) ; head small, obovoid, dark brown, placed at the end of a long, pale-green, conical neck, which is retractile, both neck and head being covered by 2nd segment.

The foregoing descriptions are taken from the summer larvæ, feeding on flowers of *Cimicifuga racemosa*. The larvæ in the fall, feeding on flowers of *Actinomeris squarrosa*, differ much in color from the description after second moult, being generally in last two stages yellow-green and olive-green, the sides darkened, the dorsum lighter, and there is an absence of the brown patches seen in the summer larvæ ; the back of 2nd segment sometimes green, sometimes brown. On the dark shades of the sides the stellate processes are often pink.

Before changing to chrysalis the summer larvæ sometimes turn pink and from pink to brown, or become brown without the pink stage ; but others remain white, changing to sordid ; the body contracts to about .3 inch, and becomes rounded. Duration of larval stages 19 days.

CHRYsalis—Length, .28 inch ; greatest breadth, .12 inch ; the ventral side straight, the dorsal rounded and evenly except for a very slight depression below the mesonotum ; both ends rounded ; the abdomen broadest ; color dark brown or yellow-brown, varying ; on dorsal part of abdomen on either side is a row of blackish dots, continued to

the mesonotum ; some examples have the wing cases green tinted. Duration of this stage, in the few instances in which the butterfly emerges the same season, from 30 to 60 days, but most chrysalids pass the winter.

NOTES ON THE LARVA OF LYCAENA SCUDDERI.

BY THE EDITOR.

The announcement of the interesting discovery of honey tubes in the larvæ of *L. pseudargiolus*, and consequent attendance of ants, as detailed by Mr. W. H. Edwards in the present issue, brought to our mind the fact that we had observed ants attending the larvæ of *L. Scudderi* some ten years ago. We were under the impression that we had subsequently published a description of the larva and drawn attention to this fact of ant attendance, but on examination find that we omitted doing so, and take this early opportunity of giving the results of our observations in confirmation of this curious discovery by Mr. Edwards.

On the 22nd of July, 1867, we visited a locality where some three weeks previous *Lycaena Scudderi* had been very abundant, our object being to search for the larva of that species. After considerable effort we succeeded in finding a larva on the common blue lupin (*Lupinus perennis*), which afterwards proved to be that of *Scudderi*. This larva was feeding on the upper side of the leaf, and we were surprised at seeing several ants actively running about the leaf and repeatedly over the body of the caterpillar, without disturbing it in the least. The search being continued, several more larvæ were found, their discovery being made comparatively easy from the invariable presence of these active attendants, otherwise their color being so closely like that of the leaf, they would have been very difficult to find. We were unable then to account for the cause of the attendance of the ants, and for the placid behavior of the larvae under the circumstances. Doubtless this species in the larval state is furnished with similar secreting tubes to those described and figured by Mr. Edwards as occurring in *pseudargiolus*.

The following description of the larva was taken at the time :

Length half an inch ; body somewhat onisciform, distinctly annulated.

Head very small, black and shining, and drawn within the second segment when at rest.

Body above dull green with a velvety appearance, occasioned by the presence of many short, fine, whitish hairs and minute dots of a brownish color, neither of which were plainly visible without a magnifier. A dorsal stripe of a deeper shade of green margined with a faintly paler hue. Sides of body striped obliquely with lines of a slightly paler shade of green. A lateral cream-colored stripe close to under surface extending from the anterior portion of third segment backwards.

Under surface similar in color to upper, with a darker shade having a faintly bluish tinge along the middle ; feet and prolegs tipped with pale brown.

One specimen became a chrysalis on the 28th of July, and produced the imago on the 8th of August.

MISCELLANEOUS MEMORANDA.

BY C. E. WORTHINGTON, CHICAGO, ILL.

Larva of *Arzama obliquata* Grote.—Found April 23rd, under the bark of a dead maple about three feet from the ground, where it had made for itself an oval cavity in the dust.

Head small and black ; head and first four segments flattened above ; 1st segment black, edged with light brown and with a light brown dorsal stripe ; remaining segments dull olivaceous brown, slightly pubescent, and having the greasy appearance of an *Agrotis* larva. No dorsal stripe back of 1st segment ; 1st and 2nd segments project laterally over stigmata ; immediately below the stigmata on each side is a faint, narrow, brown stripe, below which the color is much lighter. Anal segment with a fleshy fold slightly resembling that of *Catocala crataegi*.

Length 2 inches. Diameter not taken, but is small in proportion.

Pupated April 27th, without spinning a cocoon. Pupa light reddish brown without markings, $1\frac{1}{2}$ inches long and very slender. Imago—May 18th; ♂.

The situation in which the larva was found, the small head and general appearance indicate a subterraneous habit, and, indeed, aside from its extreme slenderness, the resemblance to some species of *Agrotis* is striking.

Larvæ of *Hemileuca maia*, May 30th, in considerable numbers on Willow. These larvæ are gregarious while young, but after the 3rd moult scatter, and deserting the willows, appear to eat anything that falls in their way. I have seen during the summer (July and August) individuals several miles from the marshes and upon almost every plant I can name. Imagoes abundant in October in the morning, but on every occasion, though hundreds might be taken before 12 o'clock, not one could be found after 1 o'clock.

Pupæ of *Smerinthus excaecatus* beneath willows. Imagoes in June. Much larger and more highly colored than in eastern examples.

S. modesta from larva found on Cottonwood.

August 6th—*Erebus odora* ♀ in the water closet of a business block in the heart of the city. The apparent fondness of many rare species of Lepidoptera for a fetid odor leads me to suggest the experiment of sugaring a few trees apart from the others with ale and molasses, in which some assafoetida has been dissolved.

August and September—Larvæ of *Ennomus alniaria* abundant on maple. This larva evidently changes its color somewhat with different food, as these closely resemble the bark of this tree. Imagoes in Sept.

Larva of *Apatela americana* abundant in same locality, but later in the month to be found clinging to the twigs, completely honey-combed by some species of *Chalcis* (?).

Larvæ of *Sphinx chersis*, *S. gordius* and *D. undulosa* in company on black ash.

September 20th–October 3rd.—Eight examples of *Macrosila 5-maculata* from larvae which pupated in July. My experience with *P. achemon* would apply to this species also, as I had nearly full-grown larvae this year before my over-wintering pupae had fairly begun to emerge. I am informed that perfect imagoes are usually taken here in July and late in September, but have never seen one in the spring.

Early in August I took a *Papilio asterias* ♀ with large blotches of a yellow fungus, as yet unidentified, on the wings. The growth mentioned by Mr. Aaron may be something of this nature.

DESCRIPTION OF A NEW DREPANODES.

BY A. R. GROTE,

Director of the Museum, Buffalo Society Natural Sciences.

Notwithstanding the variability of *D. varus* Groté, of which species *D. sesquilinea* is stated by Dr. Packard to be the ordinary male form, there can be no doubt that a very interesting species from Maine (Prof. Fernald) and Massachusetts (Mr. Roland Thaxter) is distinct from any previously described. In this form the exterior line is *without* a costal angulation. It may be called

Drepanodes Fernaldi, n. s.

♀. Larger than the other species, light purplish brown. The two transverse lines composed of broken black lunules shaded with white. A black discal point on primaries. A median diffuse brown shade near the exterior line and continued on hind wings. The exterior line extends straight to costa near apices and is here not angulated; it is continued on hind wings, but merely as a white sub-lunulated line with black pointlets on the veins. Terminal space on fore wings shaded with brown. Fringes on both wings pale. Edge of secondaries brown. Beneath paler than above, sub-irrorate. A common white exterior lunulated line marked by black pointlets on the veins. Discal dots on both wings.

Expanse 31 mil. Two specimens examined, not differing in any way. The apices are acute, but not falcate. The costal edge is paler than the rest of the wing. The more brownish color and the peculiarities of the transverse line will at once distinguish this species. I am greatly indebted to Mr. Roland Thaxter for the type taken at Newtonville, Mass., June 16th, 1877.

A NEW HEPIALUS FROM NEW YORK.

BY A. R. GROTE, BUFFALO, N. Y.

Hepialus auratus, n. s.

This species is smaller and slighter than *argenteomaculatus*, and differs from any previously described from our territory by the gilded primaries, which are as brilliant as those of *Plusia verruca*. Dull lilac or pinkish fuscous. Fore wings falcate, with a fine brown line on submedian fold. Between the subcostal vein and submedian fold the wing is covered centrally with large patches of dead gold. There are two brown costal patches, between which are double pale lilac marks, the inceptions of the transverse lines, of which the outer beyond the outer brown patch is alone continuous, broad, irregular. Some dead gold patches about the discal mark, which is finely margined with brown, pyramidal, bright gilded. Three similar bright gilded, triangulate, brown-edged spots, form part of the subterminal line opposite the cell. Else the s. t. line is narrow and brownish, broadly margined by dead gold shading on either side. Hind wings pinkish fuscous with orange fringes. Beneath fuscous, without marks; external margin of primaries touched with orange; the short fringes shaded with orange on both wings.

Expanse 48 mil. Lewis Co., New York, July, Mr. W. W. Hill.

ENTOMOLOGICAL INDEX TO AGRICULTURAL REPORTS.

We have lately received through the kindness of the author, Professor Townend Glover, a most valuable publication entitled "Manuscript Notes from my Journal," being an Entomological index to the names, &c., of insects occurring in the annual agricultural reports published by the Department of Agriculture at Washington from 1854 to the present time, with a list of the vegetable and animal substances injured or destroyed by them.

This work is published in quarto form, and uniform in style with the previous works of the same author on Diptera, Hemiptera and Orthoptera, noticed in the earlier volumes of this journal. The first 77 pages is occupied with an alphabetical list of the names of the insects referred

to in the various reports, with brief explanatory references. Following this we have a list of insects to a greater or less degree beneficial by destroying noxious insects, a paragraph on other agencies referred to as useful in the destruction of insects, concluding with a list occupying 21 pages, also alphabetically arranged, of vegetable and animal substances injured or destroyed by insects.

The compilation of this work has been attended with much labor, and furnishes another evidence of the untiring industry of the author. It will prove an invaluable help to all who desire to consult the pages of these reports for information on Entomological subjects, and it is much to be regretted that the edition is not sufficiently large to make it accessible to all who may be interested in Entomology.

NOTE ON THE STRUCTURE OF NEPHOPTERYX ZIMMERMANI.

BY A. R. GROTE, BUFFALO, N. Y.

The following note on the structure of *Zimmermani* is taken from a MS. paper on the N. Am. *Phycidæ* which I am preparing for publication. I would be glad of more material in this group from any correspondents.

"*Pinipestis* (sub-gen. nov.).

Maxillary palpi alike in both sexes, concealed by the porrect labial palpi, which have the third article erect and exceed the front. Ocelli present. Male antennæ very slightly bent at base, where they show slight continuous scale-tufts; ciliate beneath. Fore wings with veins 4 and 5 running close together at base; these veins are seen to have a separate origin, 5 on the cross-vein close to 4, divaricating at one-third from base. Hind wings 8-veined; vein 5 running close to 4 at base, but separate and continuous with the discal cross-vein. Head behind with a thick transverse ridge of scales; clypeus with a bunch-like projection of scales centrally."

I have corrected my former statement as to vein 5, having made a fresh observation under a 1-inch objective. This correction will not allow of the species remaining under the sub-genus *Dioryctria* as defined by Heineman, and presumably establishes *Pin. Zimmermani* as distinct from the European *Dior. abietella*.

CORRESPONDENCE.

By this mail I send you a pair of *Nephopteryx Zimmermani* Grote. If I am not mistaken, they will interest you as a new and very destructive insect; and I think you are more interested in noxious insects than Entomologists generally are. There is scarcely a Pine more than 4 ft. high, on our grounds, that is not more or less affected by this borer.

I have found it on *Pinus strobus*, *P. rubra* or *resinosa*, *P. austriaca*, *P. sylvestris*, *P. cembra*, Corsican, Lofty Bothan and Russian Pines. *P. sylvestris* seems to suffer most, as the limbs, and often the main stem, are constantly breaking off. Only a few days ago one of our finest specimens of *P. strobus* (a tree over 30 ft. in height and almost perfect in shape) had about 6 ft. of the top broken off—the effects of this borer. I am in hopes that the small parasitic flies I found in the larva will soon get the upper hand, so as to keep them in check.

I have been after this borer for several years, but did not succeed in getting the perfect moth until the summer of 1876, and until then supposed they were only on *P. sylvestris*.

CHAS. D. ZIMMERMAN.

571 Main St., Buffalo, N. Y., Dec. 26, 1877.

[The specimens so kindly sent by our esteemed correspondent reached us in good order and will prove a valuable addition to our collection, for which we tender our sincere thanks.—ED. C. E.]

May I suggest that the “seeming growth” on the eye of *Papilio philenor*, to which Mr. E. M. Aaron calls attention at p. 200, is probably the pollinia or pollen masses of one of the Orchidacea, objects which have before now puzzled unbotanical Entomologists. Of course, without seeing the things in question, I can only suggest this as a probable explanation. In Mr. Darwin’s work on the “Fertilization of Orchids,” as well as in the works of other authors on the same subject, will be found lists of the insects on whose proboscises (generally—or at least near that organ) pollinia have been noticed. Examples have also come under my own notice. Mr. Aaron should watch the butterflies, and if he finds them visiting any Orchidaceous flower, let him take a fine pin or grass stalk, and inserting it into some of these flowers, gently, and in the same manner in which the insect would insert its proboscis, the result will probably show him the way in which the apparent growths are deposited.

[F. BUCHANAN WHITE, Perth, Scotland

The Canadian Entomologist.

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No. 2

OBSERVATIONS ON THE EGGS OF CLISIOCAMPA SYLVATICA AND AMERICANA.

BY THE EDITOR.

Some time during the month of October last we were informed by Mr. B. Gott, nurseryman of Arkona, Ont., that he had observed on cutting into clusters of the eggs of *Clisiocampa* that the larvæ were at that time fully formed, a fact he had discovered by the use of a magnifying lens. It was our intention to take an early opportunity of verifying this statement by examination of the eggs under higher powers of the microscope, but delayed doing so for want of time. During the latter part of November Mr. A. Puddicombe, one of the members of our Society here, a careful observer and good microscopist, independently made the same discovery by cutting into clusters of these eggs with a sharp knife. He submitted the results of his observations at a meeting of the London Branch of the Entomological Society, held early in December, where the eggs were opened and examined under the microscope. We found the interior of the eggs perfectly dry, with a pearly lustre, the larvæ fully developed and only awaiting warmth before making their escape. When the upper end of the egg was removed, the larvæ would frequently push their heads out and move them actively about, occasionally crawling almost or entirely out of the shell. Examinations have thus since been frequently made with eggs both of *C. sylvatica* and *C. americana*. In several instances where the egg clusters have been kept in a warm room for a week or two, the larvæ, mistaking the warmth for that of spring, have eaten their way out of the shells, and finding no food, have died. These details, we think, are sufficient to establish the interesting fact that the larvæ of both these species mature early in the fall and hibernate inside the egg, waiting the warmth of spring before eating their way out.

Recently we devoted an evening to the microscopic examination of these egg clusters, having previously collected a number of them for this purpose. In many instances it was found that the glutinous coating which covers the clusters was imperfect, that a piece here and there had disappeared, leaving the eggs bare, and in some cases patches of the exposed eggs were empty. To ascertain, if possible, the cause of this, some of such affected clusters were cut into, when they were found to be colonized by mites. The outside gummy matter is of a sufficiently porous texture to afford abundant shelter to these little friends, who had evidently eaten into the eggs and devoured the young larvæ, and had also consumed the missing portions of the gummy covering. In the range of a single section of an egg mass some eggs would be found inhabited by the larvæ uninjured, while out of others would proceed several (in some cases as many as five) active little mites, who, when thus disturbed, would run in and out of their dwelling places, and keep up a peculiar drumming motion with their tiny antennæ. We found what were probably two different forms of the same species of mite, the one so small that four or five or more could find ample room and to spare within a single egg-shell, and these were very active and nearly transparent; the other much larger, of a pale red color, with bright red eyes, sluggish in its movements and only one in each egg; indeed, one specimen nearly filled an egg. On the outside of some of the clusters were found some round pale red eggs, which we presumed were the eggs of these mites. From their structure the mites appeared to belong to the genus *Trombidium*.

We have submitted examples of these insects and egg clusters to Dr. H. Hagen, of Cambridge, Mass., and he has kindly and promptly examined them and confirmed the correctness of the views above advanced. Dr. Hagen says that he found the supposed mite eggs both empty and full of the small, active, white creatures, that these active specimens are doubtless the young of the larger red form, which latter is .04 inch long, and he is of opinion that it belongs to *Trombidium*. He further says: "In the whole European literature I have not been able to find anything about Acari eating eggs, so the fact seems new and is very important."

On almost every cluster we have examined we have found more or less of these mites, and if they are thus generally distributed over the whole district inhabited by the moths, they must prove a most efficient check to the undue multiplication of *Clisiocampa*. In No. 8 of our last

volume we drew attention to the fact of the enormous abundance of the larvæ of *C. sylvatica* last year in many of the western portions of Ontario, and to the further fact that we had found a large number of the larvæ to be infested by parasites, both Dipterous and Hymenopterous. Notwithstanding this, large numbers matured and their egg clusters are numerous distributed over almost every forest and fruit tree. We have no evidence that birds devour many of them, hence we warmly welcome this new found friend, who has doubtless been silently working in our interest for many years past. In 1868 the larva of *sylvatica* was almost as abundant as it was last summer, while in 1869 very few were to be found. By the light of these observations it is easy to see that these destructive insects may be decimated by one of two methods, or by both; in the first place by the enormous increase of these mite enemies, or by the occurrence of a severe frost following a few warm days in spring, during which by the heat of the sun the larvæ have been incited to activity, and having left their snug winter quarters, have, while in a feeble and comparatively unprotected state, been destroyed by cold.

NEW PYRALIDES.

IV.

BY A. R. GROTE, A. M.,

Director of the Museum, Buffalo Society Natural Sciences.

I am indebted to Mr. Jas. Behrens for some Californian Pyralides. Among them is a specimen of *Orobaena octonalis* of Zeller, hitherto found in Texas and Kansas. The specimen is labelled "San Diego, Aug., 1874." Two specimens of *Eurycreon chortalis*: "Soda Sp.," and two of *Botis unifascialis*: "Sauzalito, May 27," are also present.

In the present paper I continue my descriptions and corrections. There are yet a large number of new species of *Botis*; I regret that I cannot identify many of Lederer's from his figures and descriptions.

Arta olivalis, n. s.

♂ ♀. A small species allied to *statalis*, but differing by the olivaceous cast of the fore wings above, crossed by two even parallel faint pale lines, the inner at the middle of the wing, the outer within the middle of the terminal portion; fringes vinous. Hind wings pale purplish with vinous fringes. Beneath the costal and external margins are bright wine-color; a pale common line. Abdomen beneath vinous; legs pale yellowish and purplish. Labial palpi divaricate; ocelli present; ♂ antennæ scaled above, pubescent beneath; shape of the wings much as in *Asopia*, but the costa and internal margins are even more parallel.

Expanse 14 mil. Hab. Texas, Belfrage (No. 405, July and August). This is even a slighter species than *Condylolomia participialis*.

Botis venalis, n. s.

♂ ♀. Allied to *dasconalis* by its plain appearance, but smaller and differently ornamented. Fore wings ochreous, varying in intensity of color, with darker diffuse longitudinal shades along the veins, without lines or spots. Hind wings pale, sub-pellucid, saturated with ochreous, without lines or spots. Beneath whitish, fore wings streaked with fuscous, without lines or spots. Thorax, head and palpi above ochrey, beneath white; abdomen pale ochrey above, beneath with legs whitish; fore tibiae within darker.

Expanse 26 mil. Not uncommon about Buffalo, N. Y., in June. Easily recognized by its simple ornamentation, which differs from that of any other species known to me.

Botis trimaculalis, n. s.

♂ ♀. Clay-yellow; fore wings narrower and more pointed than usual. Terminally the wing is more or less distinctly shaded with fuscous. Three open spots on median space. The orbicular round, reniform lunate and a third and smaller spot on submedian fold also open and spherical, varying in size. The stigmata are annulate with fuscous, their centres are perhaps a little darker yellow than the wing. Interior line even, bent. Exterior line not very uneven; after touching vein 2 it runs inward, rising on the interspace till it nearly meets the lower extremity of the reniform which extends over the base of veins 3 to 5. Head and thorax ochrey; abdomen ochreous on the segments above, annulated with white, beneath

whitish fuscous. Hind wings yellowish, sub-pellucid, with borders of yellowish (♀) or fuscous (♂); an extra median fuscous line and discal streak. Beneath as above, duller and more fuscous.

Expanse 25 mil. *Hab.* Texas, Belfrage, August and October, two specimens, No. 376. Resembles somewhat *Stenophyes serinalis*, but the color is different and the species is stouter.

Botis fuscimaculalis, n. s.

♂ ♀. Resembles *trimaculalis* so closely that it is difficult to distinguish it. The color is a duller yellow, the markings are all fainter, the veins are indicated by pale fuscous. The hind wings are whitish fuscous and the line is only fragmentary. Beneath the wings are more purely fuscous, without the yellowish stain. The three open spots on median space are present, but the reniform is upright, medially constricted and does not spread over the submedian nervules at base, consequently the exterior line does not come so near it inferiorly. Interior line more irregular, also the exterior line, but similarly shaped; the interior line is however deflected on the interspace between submedian vein and vein 1. But the species may be at once separated by the abdomen being whitish or fusco-whitish, not ochreous above as with *trimaculalis*.

Expanse 25 mil. *Hab.* Texas, Belfrage, No. 374; June and November; three specimens. Much narrower-winged and with more pointed apices than *Botis submedialis*.

Botis flavicolaris, n. s.

Dull yellow, allied to the preceding species. Primaries concolorous, powdery, yellow, not shining; fringes whitish. Reniform open, very faintly outlined. No spot on submedian fold. Exterior line almost obliterate, very faint. Orbicular sub-obsolete, open. Hind wings whitish, with whitish fringes, stained with yellow exteriorly; extra mesial line narrow, lost inferiorly. Beneath hind wings whitish, with the mesial line fragmentary. Thorax above yellow; palpi brown at the sides, whitish beneath. Fore wings beneath pale, with the markings traced in pale fuscous.

Expanse 21 mil. Texas, Belfrage, Oct. 11, No. 374; one female.

Smaller than *fuscimaculalis*, with the lines obliterate and of a brighter yellow.

Botis unifascialis Packard, Ann. N. Y. L. N. H., 1873.

One ♀ specimen resembles Packard's description except that the primaries have the external margin shaded with pale color like the fascia. A second ♂ has the pale shading on hind wings above no more noticeable than in the European *opacalis*, with which the Californian specimens agree in the immaculate secondaries beneath. The European representative of this species, unknown to Packard, is *opacalis*, and it resembles the Californian examples very closely.

Botis subolivialis Packard, Ann. N. Y. L. N. H., 1873.

♂ ♀. This Eastern form has the secondaries in the ♀ rayed beneath and in both sexes immaculate above; it is less like *opacalis* than the Californian examples. Packard's description takes no note of the sex, but, as in *unifascialis*, the female has the wings less pointed. *B. hircinalis* Grote is a synonym. The males have the wings more pointed, the pale fascia sub-obsolete and the hind wings beneath not rayed with fuscous and the ground color more gray.

Botis stenopteralis, n. s.

♀. Allied to *hircinalis*, narrower-winged and darker colored. Fore wings very dark brown; a discal black mark; outer line pale, even, slightly bent. Hind wings black with yellowish basal shades and a mesial yellowish broken band continuous with exterior line on primaries. Abdomen blackish above, annulate with white; beneath white. Wings beneath pale reddish ochrey, with common outer line and discal marks; external margin of both pair fuscous; primaries with the anterior (orbicular) dot present. Palpi black at the sides, whitish beneath.

Expanse 18 mil. *Hab.* Maine, Prof. C. H. Fernald.

Differs from *ablutalis* by the darker color, stouter body, narrow, even exterior line, and black discal mark on primaries above; it is not very nearly related to that species.

Botis talis, n. s.

♂. Form of *adipaloides*. Fore wings bright purple. An irregular-shaped, brown-margined, light yellow patch resting on internal margin within the middle and projected upwards on the cell; preceded on the cell by a small partially confluent similar spot. A similar quadrate patch

over the veins beyond the cell open to costa, along which the yellow color spreads towards the base. Hind wings bright purple with a very broad yellow central fascia tapering inferiorly, edged with brown or black lines. Fringes pale. Beneath paler, but as above; base of hind wings entirely yellowish. Thorax brownish purple; beneath body and legs whitish.

Expanse 20 mil. *Hab.* Marengo Co., Ala., coll. Grote.

So brightly colored and distinctly marked that it can be mistaken for no other species. The fine dark lines edging the yellow patches on primaries may be taken for the ordinary lines and the annuli of the purple stigmata.

Eurycreon anartalis, n. s.

Size of *sticticalis* and *ceralis*, but resembling a species of *Anarta* in color. Fore wings blackish, somewhat grayish about the exterior line, which is broken and fragmentary. Two black discal stains and a black curved streak below submedian vein all faintly visible. Hind wings yellowish white, blackish at base, with broad black borders; before the black borders a curved line of black points. Beneath this curved line is repeated on the yellowish white color which extends to the base of the wing, relieving a rather long curved linear discal streak, the black border as above, interlineated with pale at anal angle. Primaries blackish, with an extra median pale shade. Abdomen yellowish white beneath, blackish above, annulated with white. Clypeus tuberculate.

Expanse 22 mil. Soda Springs, Cal., Mr. Jas. Behrens, two males.

Eurycreon communis Grote.

Mr. Belfrage has sent this variable species under the Nos. 372, 373 and 375. This latter number covers specimen which, from Lederer's Taf. 12, fig. 3, I take to be *rantalis*. Under the name *communis* I have originally described paler, more yellowish specimens (373 of Belfrage) of this same species. They are not *crinitalis* Led., Taf. 12, fig. 2, for they have the interior line present as in the typical form figured by Lederer of *rantalis*. Perhaps Walker has described *communis* under the name *crinisalis*, as he gives the interior line present, and *crinitalis* Led. Zell., which I do not know, may be a different species. Again, it seems to be doubtful whether the Texan species is really the *rantalis* of Gueneé. On page 106 of this volume, line 3, read "a paler form than *rantalis*" for

"a darker form than *vautalis*." Provisionally I retain this name of *communis* for the species; if *rantalalis* of Gueneé proves identical, the name *communis* will apply merely to the paler, yellowish specimens as a color variety. There is a tendency in several fuscous brown species of this family to vary in the direction of pale yellowish or ochreous, as for instance, *Botis fracturalis* of Zeller and *Botis argyralis* of Hübner.

Crocidophora Led.

C. tubercularis Led., Taf. 2, fig. 19.

I have taken this species near Buffalo, N. Y., in June.

C. pustuliferalis Led., Taf. 12, fig. 11.

I have taken this species in Alabama. My single ♂ specimen is larger and does not agree very well with Lederer's figure.

C. serratissimalis Zeller.

I have taken one ♂ near Buffalo, and I find that my *Botis subdentalis* is the ♀ of this species, and consequently a synonym, Prof. Zeller's description being earlier.

Homophysa albolineata.

Lipocosma albolineata G. & R., 1, 28, pl. 2, fig. 22.

The ocelli are present. It is not improbable that this is the *glaphyralis* of Gueneé

Homophysa peremptalis, n. s.

♂. The smallest species, much smaller than *fulminalis* Led., of which latter I have a specimen from Texas (Belfrage, No. 394) and two from New York. Ocelli present. Fore wings ochre-brown, darker, somewhat fuscous at base. The uniform dark tint unbroken by any paler shading. Interior line exceedingly fine, composed of white scales, forming two large teeth, of which the upper is much the more prominent; the lower outward angulation on submedian fold being less obvious. The outer white line is very faint, near the external margin, evenly and widely arcuate, running inwardly submedially. Both lines very faintly relieved by dark scales. On external margin below apices are three interspaceal dark dots followed within by white ones. It is the commencement of a discontinued series, of which another is faintly visible at internal angle.

Fringes concolorous. The markings must be studied under a microscope to see them clearly. Hind wings pale at base, with a diffuse external ochre-brown patch cut by a narrow white line. A series of terminal dark points and a dark line on the ochrey fringes, both discontinued superiorly. Beneath paler, glistening, shaded with ochre-brown outwardly and with the exterior marked in a darker shade on primaries. Body and legs pale.

Expanse 10 mil. Amherst, Mass., Mr. L. W. Goodell, No. 708.

Homophysa eripalis, n. s.

♀. Size and color of *reniculalis* of Zeller, of which I have a specimen from Texas (Belfrage, No. 396, Oct. 16), but differing by the want of discal maculations on primaries. The fine white relieved lines more distinctly marked on costa of fore wings. Head and appendages ochrey and whitish; thorax ochreous. Fore wings entirely fuscous, with a very fine inner slightly waved line, and the outer line very near the margin, arcuate above, running in submedially and very slightly angulated on internal vein. The concolorous fringes are white tipped. In a second specimen from Alabama the base of the wing is slightly ochre-shaded. Abdomen above fuscous, finely white ringed. Hind wings concolorous, more fuscous exteriorly and inferiorly, where they show the white mesial line relieved by dark scales more distinctly. Beneath the common white relieved exterior line is continuous.

Expanse 16 mil. Texas, Belfrage, No. 394, June 7.

Chalcoela Zeller.

Beitr. 1, 82 (528), Tab. 11, fig. 12, *a* and *b*.

Chalcoela aurifera Zell., Beitr., 1, 83 (1872).

This smaller of the two species which I refer to this genus is yellow ochre in color; the median lines blackish, disconnected, the outer line with an inferior sinus and situate well towards the outer margin of the wing. Median space washed with gray, which spreads over the terminal space inferiorly. Taken in Texas by Belfrage; No. 417.

Chalcoela Robinsonii.

Cataclysta Robinsonii Grote, CAN. ENT., 3, 181 (1871).

The ocelli are absent. This is larger than its ally and darker colored, of a honey brown. Median lines white; outer line with a more acute

discal projection, and without an inferior sinus. The median space is much narrowed inferiorly. The grayish shade over median space is continued to costa; in its ally the costal region is of the ground color of the wing. I do not detect the brilliant line on the external margin of the fore wings in *C. Robinsonii*; the curved apical line is present in both forms. The hind wings are darker in *C. Robinsonii*, and show a clear white line before the series of black and golden marginal dots. The inner line on primaries is white and curved, not straight as in its ally, and the terminal space is wider and freer from grayish shades in *C. Robinsonii*.

OBITUARY NOTICES.

Death has of late been making serious inroads among the ranks of our fellow laborers in the Entomological field. An old veteran among American Naturalists, Dr. J. P. Kirtland, of Cleveland, Ohio, has passed away, while recent advices from across the Atlantic announce the deaths of Mr. Andrew Murray and Mr. T. V. Wollaston. Most of the details given in reference to the lives of the two latter are condensed from memoirs which have just appeared in *The Entomologist*, of London, Eng.

DR. JARED P. KIRTLAND

was born at Wallingford, Conn., on the 10th of November, 1793. His youthful studies were pursued at Wallingford and Cheshire Academies, and being a bright, active boy and an earnest student, he soon made rapid and substantial progress in the classics as well as in English studies. As a boy he was enthusiastic in the study of natural objects; he knew the habits of almost every animal and bird that frequented his youthful haunts, and at twelve years of age was engaged in practical experiments in the cultivation of silk worms. About the same time he began the study of Botany, and soon applied his knowledge to a series of valuable experiments in the crossing of fruit trees with the view of improving the quality of fruits. His success in this department is well known to all intelligent cultivators of fruits in America, his hybrid cherries having won for him a

fame which time can never obliterate. His grandfather was a physician in Connecticut, and at his death his promising nephew, now eighteen years of age, inherited his grandfather's medical library and a sufficient legacy to enable him to acquire a medical education. He had made arrangements to pursue his studies in Edinburgh, when the war with Great Britain prevented him. About this time the medical department of Yale University was opened, and young Kirtland was the first student on its matriculation roll. Subsequently he graduated at the University of Pennsylvania, and in 1815 returned to his native place, where he practised medicine for two years and a half, devoting all his leisure moments to the study of natural science, for which he had developed a passion which influenced all his after life. He next removed to Durham, Conn., where he enjoyed an extensive practice for several years, when the death of his wife and child again unsettled him, and he removed to Poland, Conn. Five years later he was elected to the Legislature, where he served three terms, after which he was called to fill the chair of Theory and Practice of Medicine in the Ohio Medical College at Cincinnati, which he did with distinguished ability for five years, when the duties becoming irksome to him, he resigned the position.

When in 1848 the first Geological Survey of Ohio was organized, Dr. Kirtland was appointed to superintend the natural history department, and in due time presented a series of reports which attracted general attention. He labored diligently among the Fishes, Birds, Mollusks, Reptiles and Insects of Ohio, sketching many of them with his own pencil and describing them with an enthusiastic fidelity. During his researches he collected a large and valuable cabinet of specimens with the design of forming a State Collection, but Ohio refused the substantial aid which this enterprise required, and as his collections had been made largely at his own expense, he retained possession of them and they were ultimately donated to the Cleveland Society of Natural Sciences, where they are now treasured as a priceless heritage.

In 1837 Dr. Kirtland had purchased a choice fruit farm five miles west Cleveland, and had there settled, as it proved, for the remainder of his life. Four years after this he was appointed a Professor in the Medical Department of the Western Reserve College, in Cleveland, a position he filled with honor for twenty-one years. In 1861 Williams College conferred upon him the degree of L. L. D., in recognition of his services, and many learned societies during his lifetime delighted to do

him honor. Among his Entomological papers, that which perhaps attracted most attention was his Notes on the Diurnal Lepidoptera of Western Ohio.

During the summer of 1872 it was our privilege to visit this veteran naturalist. We found him enjoying his quiet retirement among his flowers, fruits and insects, actively interested in everything that was going on about him. He gave us a most cordial welcome, and we spent a delightful afternoon together scanning his botanic and insect treasures. Although nearly 80 years of age, he retained all his faculties in apparent perfection, his eyesight being so well preserved that he could read ordinary print with the greatest ease. He died after a short illness at his home, on the 11th of December, 1877, at the ripe age of eighty-four years. He was among the most genial and winning of men, with a heart warm and steadfast. His temperate, well-ordered life preserved him in the full vigor of manhood far beyond the years at which men ordinarily grow old. He had no dissipation but hard work, no extravagance but lavish generosity to his friends and overflowing charity for the poor. In his seventieth year of patient labor he wrote as his motto over his desk: "Time is money; I have none of either to spare." Thus this tireless man of science labored to the end, laying down the work he loved so well after fourscore and four years of labor and usefulness, only at the call of the Master.

MR. ANDREW MURRAY, F. L. S.

This accomplished naturalist died at his residence, 67 Bedford Gardens, Kensington, on the 10th of January last. Mr. Murray was the eldest son of Wm. Murray, Esq., and was born in Edinburgh on the 19th of February, 1812, where he resided until 1860. In his early years he manifested a fondness for natural science which strengthened as he matured. He was educated for the law, and subsequently devoted some attention to the study of medicine. During the last few years of his life in Edinburgh he labored hard in the interests of science; in 1858 he was elected President of both the Botanical Society and Physical Society, and just previous to his removal to London he contributed an elaborate paper to the Royal Society of Edinburgh, on the "Pediculi Infesting the Various Races of Man." In 1860 Mr. Murray came to London, and was appointed Assistant-Secretary to the Royal Horticultural Society, and from this time he devoted himself to his work as a scientific Botanist and

Entomologist, becoming celebrated in the former as the monographer of the *Conifera*, and in the latter as the morphographer of the *Nitidulidæ*. From 1852 to 1863 he published thirty-eight separate papers. In 1866 he published his well-known work on the "Geographical Distribution of Mammals," in which he bestows especial attention on the habitat during geological as well as glacial and present epochs, with copious synonymic lists, including locality past and present, geographical classification and colored maps of distribution, showing the result of his own careful research. In 1869 he accompanied Sir Joseph Hooker to the Botanical Congress of St. Petersburg, as one of the representatives of British Science, his services there being complimentarily acknowledged by the presentation by the Emperor Alexander of a malachite table of great beauty. In 1871 he was entrusted with the superintendence of the arrangements connected with the British contributions to the International Exhibition of Moscow of the following year. He was Secretary to the Oregon Conifer Collection Committee, and in 1873 undertook an expedition to Salt Lake and California, with various scientific objects. On his return from the West he visited Canada and spent a few days with some relatives in London, Ont., during which time we were happy in making his acquaintance and of forming with him a warm friendship which only terminated with his life. During his short sojourn in Utah he contracted an illness which greatly increased in severity, and, indeed, almost prostrated him on his return to Europe. Subsequently he rallied and for several years enjoyed moderate health. In the course of last season further indisposition followed, and he gradually sank, but so assiduously occupied with his labor of scientific usefulness to his latest days, that few were prepared to hear of their close.

But it is with Andrew Murray as an Entomologist that we are most deeply interested. In early life he aided his relative, John Murray (Lord High Advocate), in his wish to provide some practically useful reading for village schools, by writing the little pamphlet, "The Skipjack, or Wire-worm and the Slug," which, though published without his knowledge, may be looked upon as his first contribution to Economic Entomology. He contributed many papers on Entomology to various scientific societies and publications, both home and foreign, but his great work was done in the last ten years of his life, which he devoted to illustrating the study of insects in its natural and practical bearings. It was in 1868 that the charge of receiving and arranging a government collection of Eco-

onomic Entomology was placed in his hands officially, and from the first he devoted himself unceasingly to the task of making this as perfect as possible. Himself an accomplished draughtsman, and a patient worker and compiler, with a great love for the subject, he spared no pains in his work, whether in availing himself of scientific co-operation or in shaping the aid placed at his service by those less gifted than himself, in the details of field observation, and of museum illustration by colored drawings or fac-simile modelling. This collection is already a nucleus of a very valuable, popular and illustrated history of insect friends and insect foes, the practical value of which is already appreciated and bearing good fruit for public benefit. On this collection, of which one hundred and fifty cases are more or less complete, Mr. Murray was working up to his latest days, leaving a large collection of oak-galls and illustrative drawings still in progress of arrangement. To assist in the circulation of information a series of guides to the collection were projected. These were to take the form of popular hand books to Entomology, and were to be prepared by Mr. Murray and published under government supervision. Of the eight intended volumes only one has appeared; this treats of the Aptera or wingless species, and was noticed in the CANADIAN ENTOMOLOGIST for July, 1877. In the midst of his busy labors he was called away. We have lost in him a man of varied accomplishments, a thorough, painstaking Entomologist and a good Botanist. Those who knew him best will deeply feel his loss; not only will they miss the gifted naturalist, they will also grieve for the sudden removal of a friend so kind and true hearted.

MR. T. V. WOLLASTON, M. A., F. L. S.

This talented Entomologist died on the 4th of January last, at his home in Teignmouth, Devonshire, at the age of 56, from disease of the lungs, with which he had been more or less afflicted for thirty years past. In early life Mr. Wollaston became well known for his valued researches into the Coleoptera of the Maderian, Canarian and Cape Verd Archipelagos, which he personally explored. His valuable writings on the Coleopterous fauna of these islands, and especially his account of the insects of the Madeira group, are well known to Entomologists in the "Insecta Maderiensia," published in 1854. Subsequently he published catalogues of the Coleoptera collected by him in these several groups of

islands. His volume on the variation of species, dedicated to Mr. Chas. Darwin, and published in 1856, is well known. His shorter papers, chiefly relating to Coleoptera, embodying the results of original research, contributed to English and foreign scientific journals, range over a period of more than 30 years. In the autumn of 1875, feeling it desirable to seek a warmer climate, he visited St. Helena, where he devoted himself assiduously to the study of the Coleoptera inhabiting the island, of which work we have the record in his "Coleoptera Sanctæ Helenæ," lately published. This was Mr. Wollaston's last contribution to Entomological science, and is characteristic of its author in the finished elegance as well as clearness of its style. He returned to his home in the early summer of 1877, and thenceforward devoted himself to the task of arranging the valuable mass of information he had accumulated during his absence, and of which he leaves us the record in the work just referred to. He was a man of highly refined and accomplished mind, as well as of great scientific attainments, and will be much missed from the ranks of our leading naturalists, as well as by those whose progress he aided by his encouragement and counsel.

NORTHERN OCCURRENCES OF PAPILIO CRESFONTES.

BY THOS. E. BEAN, GALENA, ILLINOIS.

The *American Naturalist* for November, 1877, contains on p. 688 the following paragraph :—

"PAPILIO CRESFONTES IN NEW ENGLAND.—On the 6th of last September Mr. N. Coleman captured in the vicinity of Berlin, Connecticut, the only specimen of this Southern insect ever recorded from New England. As the larva is not known to feed on any other plant than the orange, the butterfly probably hatched from a larva accidentally transported with trees from Florida, or emerged from a chrysalis sent North as a curiosity."

The writer of the paragraph appears to have mislaid certain pages of recent Entomological literature.

The CANADIAN ENTOMOLOGIST has comments upon this butterfly in several of its volumes :—

Vol. 1, p. 19.—*P. thoas* captured at Amherstburg, Ontario, in 1868 ; said to be quite common there.

Vol. 6, p. 140 (1874).—" *Papilio thoas*—several taken. This insect was quite common in almost every clover field in that neighborhood"—a locality in the county of Essex, Ontario. . . . "Mr. Lowe took two specimens of *thoas* last season on the River St. Clair, near Port Lambton."

Vol. 7, p. 181 (1875).—"Mr. Cook said that *thoas* had been found this year at Lansing," Michigan—"that it occurred there to his knowledge some three years ago, and that last season it was quite common, the larva feeding on prickly ash."

In Vol. 9, p. 160 (1877), Mr. J. M. Denton records capture of *eleven P. thoas* on 1st and 2nd of August, in a field near Amherstburg, Ontario.

In *Proceedings Davenport Academy Nat. Sci.*, vol. 1, Mr. J. D. Putnam cites occurrence of *cresphontes* at Davenport, Iowa, and at Aledo, Illinois, 30 miles south of Davenport.

The insect is known to have occurred in West Virginia, Kansas, Illinois, Wisconsin, Connecticut (as above), Michigan and Ontario.

The fullest note I have found is by Prof. F. H. Snow, in *Trans. Kansas Acad. of Sci.*, vol. 4, p. 30 : "Common in 1873 and 1874 ; rare in 1871, 1872 and 1875 ; feeds upon the prickly ash and the hop-tree in this region—upon the orange tree in the Southern States."

For this locality (Galena, Illinois) I have only a meagre record :—1872, ♀, August 15, new ; 1873, a worn specimen, Sept. 8 ; 1874, several seen toward end of August.

The record of *cresphontes* in Ontario seems to indicate two broods. Mr. Lowe's captures in Essex County in 1874 were made between 10th and 20th June, and again in 1875 he observed the butterfly in the same locality between 6th and 30th June (CAN. ENT., vol. 7, p. 139-40). But Mr. Denton—as above cited—took eleven specimens early in August, near Amherstburg.

The foregoing references will serve to show that *cresphontes* is in some degree habituated in the North, as regards both climate and food plants, and that no special theory is required to account for the disclosure of an imago in New England.

NOTES ON ARGYNNIS ALCESTIS EDW.

BY C. E. WORTHINGTON, CHICAGO, ILL.

The occurrence of this species in considerable numbers in this vicinity has afforded an opportunity for comparison with *A. aphrodite*, the results of which are appended.

It should be stated that although the number referred to is small, yet the unrecorded comparison of over two hundred examples of both species during the past summer has agreed fully with this. In the line before me are five females each of *alcestis* and *aphrodite*. In every case the general color of the upper surface is duller in *aphrodite*, the basal shading heavier and more extensive, and the black markings on *primaries* heavier; in two examples the color approaches that of *A. cybele*, while the examples of *alcestis* exhibit a uniform clear color with hardly any variation.

On the secondaries the submarginal lunules are serrate in two cases in *alcestis*, all the other black markings being uniformly lighter, especially the Ω spot in the disk, which is nearly or quite separated into two black spots. No other differences discernible. Beneath *aphrodite* exhibits a narrow, irregular, bright band on secondaries, between the two outer rows of silver spots; this is conspicuous in all the examples I have examined; there are also spots and patches of lighter color on the disk.

The under surface of the secondaries in *alcestis* differs widely from this; the whole of the wing is one sheet of uniform color, broken only by the usual silver spots and some black spots, one immediately behind the largest silver spot being very conspicuous in three examples. The silver spots are proportionately larger and closer together, and partially margined with black, much more conspicuously so than in any example of *aphrodite* that I have seen. In none of these is there the faintest trace of a band, while the general color is darker than in any examples of *A. idalia* taken here.

Five males of *aphrodite* and three males of *alcestis* exhibit the same differences above as females, though in a less degree; beneath the band is conspicuous in *aphrodite* ♂ as in the ♀, but obsolete or indicated by a faint shade in *alcestis*. The spots and patches of lighter color are nearly or quite absent in the latter, and the comparative size of silver spots as in ♀. In all cases these spots are more symmetrical in shape in *alcestis* than in *aphrodite*.

It should be added that the males approach each other more closely than the females.

Alcestis is quite abundant on the prairie west and north of this city in July and August ; it seems to be quite local, as examples taken a few miles north in a timbered region are almost uniformly *aphrodite*. I have been greatly surprised at the readiness with which a strong *aphrodite* upon the prairie can be distinguished while on the wing from the surrounding *alcestis*, owing mainly to a slight difference in its manner of flight, which resembles that of *cybele*.

The difference of time of the appearance of the sexes in *alcestis* appears rather to exceed that in other species, the order of capture of the first examples of the larger *Argynnidæ* being as follows : *Alcestis* ♂, *idalia* ♂, *aphrodite* ♂, *aphrodite* ♀, *cybele* ♂, *cybele* ♀, *alcestis* ♀, *idalia* ♀.

The habitat of *alcestis* extends farther west and not so far south as that of *aphrodite*. Since the publication of Mr. Edwards' Catalogue I have received good examples from Michigan, and am informed that it has been taken in New York.

In faded examples of *alcestis* (Sept.) a faint shade is observable in certain lights between the outer rows of silver spots on secondaries, but broad and regular like the band of *cybele*, and not in the least resembling that of *aphrodite*.

ANNUAL MEETING OF THE LONDON BRANCH OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Annual Meeting of the above Branch was held on the evening of Jan'y 15th, 1878, at the residence of Mr. Chas. Chapman, when after the routine business had been transacted, the following gentlemen were elected as officers for the current year :—

President, J. M. Denton ; Vice-President, A. Puddicombe ; Sec'y-Treasurer, J. H. Bowman ; Curator, Chas. Chapman ; Council—H. Bock, W. Saunders, J. Williams ; Auditors—H. Bock, W. Saunders.

A pleasant hour was then spent in discussions on insects and their habits, after which the members adjourned.

BOOK NOTICES.

Descriptions of Noctuidæ, chiefly from California, by A. R. Grote. Extracted from the Bulletin of United States Geological and Geographical Survey; large 8vo., pp. 18, containing descriptions of thirty-three new species, chiefly of *Agrotis* and *Hadena*.

New Tineina from Texas, Food Plants of Tineina, and Index to the Described Tineina of the U. S. and Canada, by V. T. Chambers; also from the Bulletin of the U. S. Survey; large 8vo., pp. 88. In this pamphlet there are forty-two new species described. A catalogue of the food plants of the Tineina of America, as far as they are known, is given, followed by a very complete and useful index embracing all the described American species.

President's Address before the Appalachian Mountain Club, by Sam'l H. Scudder. Reprinted from Appalachia, Vol. 1, No. 4; large 8vo., pp. 32. Our thanks are tendered the several authors of the above for their kindness in sending us copies of these pamphlets.

CORRESPONDENCE.

PIERIS VERNALIS AND P. PROTODICE.

DEAR SIR,—

In confirmation of Mr. Bean's conclusions, as given in the November number, I would state that I have long known *vernalis* to be but the spring form of *protodice*, and believe I so wrote to Mr. Edwards some time ago. What is probably the first record of this opinion will be found in my 9th Report on the Insects of Missouri (p. 57). My experience accords with Mr. Bean's as to there being every possible gradation between the extreme *vernalis* form and the typical *protodice*. What is true of these two supposed species will, I am confident, be found to be equally true of several other of Mr. Edwards' described species, especially in *Colias*; but no one perhaps is more willing to admit the fact at present than Mr. Edwards himself, or is doing more by careful breeding to decrease the number of his own species.

C. V. RILEY, St. Louis, Mo.

DEAR SIR,—

Having been requested some years ago by Prof. Just, of Carlsruhe, to co-operate in the annual botanical review, I have now agreed to take upon myself the preparation of a report in reference to those vegetable excrescences known as galls, produced by insects.

The greatest difficulty in this work arises from the fact that the literature treating on the subject is scattered throughout a great number of works and various journals, of which we find only a part in our libraries; also, those which we possess, and particularly the later publications, are often of difficult access. It is therefore quite impossible to write a complete report if the editors do not send us the various papers which issue from the press. You or your readers will oblige me greatly by sending copies of any writings in reference to galls which have appeared since 1875, as well as those which may be published from time to time. Parties sending extracts from journals will please add the date of publication. As an equivalent I shall be happy to send to any one helping me copies of my own writings on this subject.

DR. F. A. W. THOMAS.

Ohrdruf, near Gotha, 14th Sept., 1877.

[We trust that our readers will do what they can to aid Prof. Thomas in this matter.—ED. C. E.]

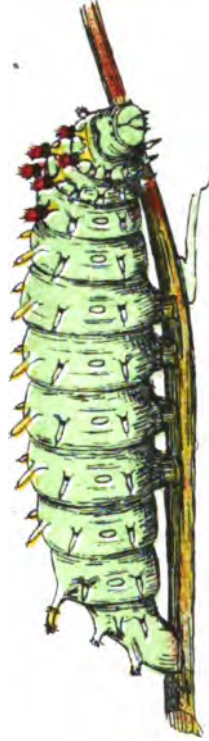
I have the pleasure of noting the capture, June 23rd, of a fine specimen of the very rare Geometrid, *Eubyja quernaria* Smith & Abb.; it was taken resting on the trunk of a Hickory tree. Early in September I took sixteen specimens of *Aspilates Lintneraria* Pack., among which were several perfect examples of the female. It is an exceedingly variable species, scarcely two specimens being alike. The females were submitted to Dr. Packard, who determined them as the *liberaria* of Walker.

L. W. GOODELL, Amherst, Mass.

I have found *Melitaea phaeton* in large numbers this season in a large swamp on the east side of Mt. Tom, four miles from Holyoke; also *M. Harrisii* in the same locality. Since the middle of August up to the present time I have found over 300 larvæ of *Deilephila lineata* feeding on Purslane. They seem to be very plentiful this year; never found but a few before.

JOSEPH E. CHASE.

Holyoke, Mass., Sept. 20, 1877.



U. J. Howler

The Hurland Descriptive Lath. Group

MATURE LARVA OF SAMIA COLUMBIA

The Canadian Entomologist.

VOL. X.

LONDON, ONT., MARCH, 1878.

No. 3

SAMIA COLUMBIA.

For the beautiful colored figure of the larva of this remarkable insect we are indebted to the kindness of Mr. G. J. Bowles, of Montreal, who made the drawing and prepared the stones from which it was printed. The printing is the work of the Burland Desbarats Lithographic Co., of Montreal, and is in every way creditable to that enterprising company.

It is not a little remarkable that two descriptions of the larva of this rare insect should have reached us at the same time, and since they record observations independently made, and the subject is so interesting, we have thought it best to print them both in full, even at the risk of a little repetition.

NOTES ON THE LARVA OF SAMIA COLUMBIA SMITH.

BY F. B. CAULFIELD, MONTREAL, P. Q.

(Read Before the Montreal Branch of the Ent. Society of Ontario, Aug. 7, 1877.)

Form same as *S. cecropia*; number and position of tubercles also the same. General color green; bright yellowish green on dorsal surface; pea green on head, sides and under surface. Length when at rest exactly two and a quarter inches; when in motion almost two and three-quarter inches.

Head pea green, mouth parts pinkish grey, mandibles black.

Dorsal surface—First segment with four small flattened transversely oval warts, consisting of a black ring with a white centre; 2nd, 3rd and 4th segments each with two large bulbous tubercles, cream color, at base; above this there is a raised or swollen ring of black; remainder coral red, with seven upright spines on top; 5th, 6th, 7th, 8th, 9th and 10th segments each with two simple tubercles, basal half white, remainder bright

yellow ; the tubercles on 5th segment are tipped with three upright black spines, the others with only one each ; 11th segment with one large central tubercle, the extreme base of which is white, remainder yellow with an irregular circlet of small black warts about the middle, tipped above with three small blunt black spines ; 12th segment with four short white tubercles, anterior pair largest, tipped with four short black spines, posterior pair with a single black spine.

Lateral tubercles white, the upper row with a brown ring at base, the lower with a black ring at base ; 2nd and 3rd lateral tubercles tipped with seven black spines, 4th with five, remainder with one each. Spiracles white, surrounded with a narrow black ring. Feet green, claws black, prolegs green, claspers mauve.

I received the larva from which the above description was taken by mail, on August 1st, 1877, from J. C. Stockwell, Esq., of Danville, P. Q. Unfortunately no details were given of its capture or food plant. In the box in which it was sent were some black currant leaves ; as these were withered, I obtained a fresh supply from the garden of a friend ; it fed on these, but did not appear to be quite satisfied with them. I then tried it with apple, maple, elm and various other leaves, but it would touch nothing but the currant, and of that it ate less and less, finally, to my very great disappointment, pining away until it died. It occurred to me afterwards that it might have been found on the wild currant, as the leaves sent with it seemed to be finer than those of the cultivated species.

Although the form of this larva and the position of the tubercles is similar to that of *cecropia*, the difference in coloration will at once distinguish them, the ground color being much lighter in *columbia*, and the green inclining as much to yellow in that species as it does to blue in *cecropia*. The tints of the larva of *columbia* are more decided, not having the watery appearance noticeable in *cecropia*, the yellow being brighter and the red more intense ; but the great points of distinction are the additional red tubercles (as noticed by Mr. Bowles in 1864, see CAN. ENT., vol. 3, p. 201), and the absence of blue, the tubercles that are blue in *cecropia* being white in *columbia*. That this larva is generically the same as *cecropia* is undoubted, the only distinctions being those of size or coloring. The absence of blue in the larva of *columbia* seems to be against the supposition that it is produced by the union of *cecropia* with *promethea*, the larvæ of both these species being conspicuously marked with that color.

ON THE EARLY STAGES OF SAMIA COLUMBIA SMITH.

BY C. H. FERNALD, ORONO, MAINE.

On the night of the 7th of last June my wife captured at light a fine female *Samia columbia*. The moth was at once secured, her wings pinioned, and she was placed in a cage with the hope that specimens of the other sex might be attracted, but none made their appearance; and on the night of the 12th she laid five eggs, glueing them to the gauze on the side of the cage, two in one place and three in another. During the following day (13th) none were laid, but on the night of the 13th she laid fourteen more in several different clusters, and on the night of the 14th she laid six more. None were laid during the following day and night, and as she was injuring herself with the pinion, she was killed and spread. Whether she would have laid any more had she been kept longer, or whether she had laid any before her capture, I cannot say.

On the morning of the 26th one of the eggs hatched. I then began to look about for their food plant. Smith states, Proc. Boston Society of Natural History, vol. ix., p. 344, as follows: "They [the cocoons] were mostly attached to *Nemopanthes canadensis* and *Rhodora canadensis*; a few were found upon *Kalmia angustifolia* and maple, and one upon the larch. The larvæ undoubtedly feed upon the first two plants, and perhaps upon the others; but the cocoons were always where the larvæ might have fed upon the *Nemopanthes* or *Rhodora*."

Dr. Packard, in his Synopsis of the Bombycidæ, Proc. Ent. Soc. Phil., vol. iii., p. 380, says: "It (*S. columbia*) feeds upon *Rhodora canadensis*, spinning its large cocoons upon the terminal twigs of that shrub."

Guided by these statements, and remembering that *Nemopanthes canadensis* does not occur in this region to my knowledge, I first collected *Rhodora canadensis*, and gave them, but they never so much as tasted it, though I kept a few on it till they were nearly starved. I cut the edge of the leaf so they might have easy access to the soft juicy parts of the interior, but all to no purpose. I tried them on *Kalmia angustifolia*, *Amelanchier canadensis*, maple, beech, white birch, ash, apple, pear, willow, ilex, gooseberry, currant and larch. They just tasted of the last four, but would not feed upon them. I should say that the trial on larch was not

satisfactory, as I put but one on it and kept it there less than half an hour. Finally I put them on elm, upon which they fed a little, but died one after another.

My friend, Mr. Charles Fish, had been fortunate enough to secure a female which laid twenty-five eggs, I think, and with the young hatched from these he was having a similar experience to my own. He finally succeeded in getting the remaining few of his to eat wild red-cherry (*Prunus pennsylvanicus*). I was obliged to leave home at this time, and got my friend, Mr. Anson Allen, to take the care of my young *columbias* in my absence. Learning of Mr. Fish's success with wild cherry, he put a part of the remaining number on that plant, leaving a few on elm, all of which died, while those fed on the wild cherry succeeded in passing the first moult, and I have been able to carry three through and see them spin up their cocoons successfully. About the time these were in their later moults Mr. Allen found two *columbia* larvæ feeding on larch (*Larix americana*), so remote from other trees that there could be no possibility of their having crawled on to it from any other tree, and further, these same larvæ continued feeding on the larch in confinement for several days, and then spun their cocoons. Mr. Fish also found one or two larvæ feeding on the larch, several miles from where Mr. Allen's were found. These were all in a very healthy condition, and, it is hoped, will yield good imagines next year.

I have observed this striking peculiarity in the habits of the larva of *columbia*, that from the time they hatch till they are done feeding they never wander about, but remain upon a leaf or twig entirely unsuitable for food till they starve, even though there be fresh food within half an inch of them.

When they are fully grown and are done feeding, they evacuate their bodies and then begin to travel around their enclosure, continuing their travels sometimes for twenty-four hours, till they find a suitable place in which to spin their cocoons. At first they spin a certain amount of white or silver-colored silk, and after that has been expended, the brown silk. One of the larvæ wandered about for a long time before it appeared to get ready, or to find a suitable place in which to spin its cocoon, and all this time it was wasting its silvery silk, spinning it freely as it crawled slowly over the surface of the glass forming one side of the breeding cage. At last a satisfactory place was found, and the cocoon spun, but almost entirely without the characteristic silvery bunches upon

the outside, for the simple reason, as it would seem, that the larva had no white silk remaining to give the appearance usually seen upon the outside. I further observed that those which spun up immediately, without wandering about much, make cocoons with the most complete silvery bunches upon them. After the first long threads of the cocoons have been extended, the larva moves its mouth back and forth for a considerable length of time in one place, as far as it can move its head, thus depositing a large amount of the silvery silk in this place; then moving to another place, the same operation is performed, and so on over the whole *exposed* parts of the cocoon. I did not see that they deposited any of the silk in this way against the under surface of the glass when the cocoon was placed against it. Nearly all of the cocoons which have been found here were on the larch, and these silvery bunches certainly give them a very close resemblance to the bark of that tree.

Egg—Sub-globose, slightly compressed, the compression being least upon the side from which the young escapes; cream-colored, clouded with reddish-brown, and attached to the object upon which the female deposits by means of a dark brown adhesive substance, which appears to be the same as that which is clouded over the surface of the egg, but the greater abundance of it at the point of attachment produces a much darker color. Greatest diameter, 2 mil.; medium, $1\frac{1}{2}$ mil.; least diameter, $1\frac{1}{3}$ mil. The eggs hatched in fourteen and fifteen days after they were deposited.

Young Larva—Length immediately after escaping from the egg shell, 4 mil. Color black; some of the individuals show a greenish tinge around the base of the tubercles. Body cylindrical, slightly tapering towards the posterior extremity; head large, rounded, sparsely clothed with long hairs. The second (first after the head), third, fourth, fifth and sixth segments each with eight tubercles, the lowest one on each side much smaller than the others. The seventh, eighth, ninth, tenth and eleventh segments have each six tubercles, rather smaller than the corresponding ones on the preceding segments. The twelfth segment has five tubercles, two on each side corresponding with those on the preceding segment in size, and one on the middle of the dorsum of the same size as the upper ones on the third segment. The thirteenth segment has four tubercles on the anterior edge and one at the base of each anal proleg. The tubercles are smooth, cylindrical, gradually enlarging towards the base and at the summit, the least diameter being about two-thirds the way up; length equal to about three times the least diameter, surmounted with

from two (on the smallest) to six finely serrated, radiating bristles which are about twice the length of the tubercles. Duration of this stage eight to nine days.

After the First Moulting—Length (taken a short time before the second moult), 15 mil. Color pea green. Tubercles and bristles, mandibles, palpi and antennæ, a spot about the eyes, a stripe on each side of the clypeus, the legs and a spot on the outside of the prolegs, black. Second, third and fourth segments each with four black spots on the posterior edge and a row of black spots on each segment after the head, on the line of and behind the stigmata. Duration of this stage five to seven days.

After the Second Moulting—Length (taken soon after the second moult) 20 mil. Color pea green with a bluish tint upon the dorsum. Black markings as in preceding stage. Duration of this stage four to five days.

After the Third Moulting—Length 35 mil. Color pea green, lighter on the dorsum. Marked with black as in the two preceding stages. All the tubercles with the basal portions blue, except those on the second segment and the lower one on each side of the third to the sixth segments inclusive. Duration of this stage six to nine days.

After the Fourth Moulting—Length 50 mil. The head at the time the larva escaped from the egg-shell was proportionally large, but during the succeeding stages it did not grow so fast as the other parts of the larva, and at the beginning of this stage, but more especially at its close, it was proportionally small. Duration of this stage ten to twelve days.

Mature Larva—Length 76 mil.—about three inches. Thickness between the segments 13 mil., of largest part of segment 15 mil.

Head pea green, sparsely clothed with fine yellowish hairs. Mandibles, outer joints of antennæ and palpi, spot about the eyes, two spots on the gular (these may have occurred in the previous stages, but were not observed), and a stripe on each side of the clypeus, black, the latter sometimes wanting. Basal joints of antennæ and palpi and the labrum greenish blue. General color of the body pea green, rather lighter than the head, and lighter above than on the sides, with the faintest tinge of blue between the segments. Last joint of the legs and claw black. Stigmata oval, white, surrounded by a fine black line.

The tubercles were greatly changed at the fourth moult, both in form and color. The first and lowest on the second segment is small, conical, black and surmounted by a few short, stout, black spines. The second is

more rounded at the top, shining black at the base, and resembling white glazed porcelain at the apex, with four black spines. The next two are smaller, about $2\frac{1}{2}$ mil. apart on the front edge of the segment, the lower of which is about 5 mil. from No. 2. These are very small and black, the upper one having a trace of greenish-white at the apex, and both are surmounted with several short black spines. The lowest tubercles on segments three to six inclusive are small with black bases, apices resembling white glazed porcelain, and generally two black spines. The tubercles of the next row above, extending from the third to the last segments inclusive, are very similar in form and color, but larger; those of the row above this are slightly pear-shaped, a very little thickened towards the outer end, of the same color as the preceding, and surmounted with from four to six short stout black spines. Those of the next row on the third, fourth and fifth segments, and the corresponding ones on the opposite side of the dorsum—by far the largest on the larva—are pear-shaped, largest outwardly, porcelain white at the base, with a band of shining black above, and a bright coral-red top, with from six to eight stout black spines. The tubercles of this row on the sixth to the eleventh segments inclusive are nearly as tall, but slimmer than those preceding, slightly curving backward, porcelain white at the base, a very light straw color above and armed with two black spines at the top. The dorsal tubercle of the twelfth segment is very similar, but larger, and armed with several black spines. The tubercle at the base of the anal proleg is smaller than those before it, of a light bluish color, with black at the base outside.

The most striking differences observed between *P. columbia* and *P. cecropia*, in a brood of the latter raised by the side of the former, are—first, the smaller size of *columbia* at each of the stages; the mature larva of *columbia* is about three inches in length, that of *cecropia* about four. Secondly, *columbia* is of a clear light pea green color, *cecropia* a dull bluish green, giving a much darker aspect to this larva. This distinction of color is so marked that if once observed, the one can never be mistaken for the other. Thirdly, *columbia* has three pairs of coral-red tubercles, one pair each on the third, fourth and fifth segments; *cecropia* has two pairs, one pair each on the third and fourth segments. Then the color of these differ; those of *columbia* are a true coral or vermilion-red, while all the *cecropias* I have seen have these tubercles a color somewhat approximating that of resin. The remaining dorsal pairs of tubercles to the twelfth segment, and the central one on the twelfth, are lemon yellow, while in

columbia they are white at base and a very light straw color above. The remaining tubercles of *cecropia* are black at the base and blue above ; in *columbia* they are black at the base, but with the look of white glazed porcelain above. These distinctive characters showed no tendency to run into each other in any of the examples I have seen. As perhaps having a bearing upon the question whether *columbia* is a hybrid between *cecropia* and *promethea*, I will say that in six years of careful collecting at this place I have never taken a *promethea*, nor has one ever been taken here to my knowledge ; yet the empty cocoons of *columbia* have occasionally been found, mostly in larch trees, in one instance about forty feet from the ground.

I am therefore convinced that *columbia* is a good species, but whether distinct from *Gloveri* I am not prepared to express an opinion.

In my observations on *columbia* I have been greatly assisted by Messrs. Allen and Fish, who rendered every possible aid and placed their notes at my entire disposal.

ON FOOD PLANTS OF PAPILIO CRESFONTES (THOAS).

BY THE EDITOR.

In September last we were much gratified, although somewhat surprised, at receiving a number of the larvæ of this beautiful butterfly from Mr. S. Eccles, of St. Thomas, Ontario, a town situated about 17 miles south of London, and about half way between it and Lake Erie. They were found in Mr. Eccles' garden, feeding on *Dictamnus fraxinella*, a perennial herb which is a native of Southern Europe, but cultivated in this country for ornament in gardens. The larvæ were in different stages of growth, from one to two inches in length, and were feeding greedily on the plant referred to. We had never seen this larva before, but its markings are so peculiar that we recognized it at once from recollection of the figure given in Boisduval & LeConte, pl. 13. As this description may not

be accessible to many of our readers, we append the following free translation of it :—

“The caterpillar is of a very mixed color ; its under surface is brown as well as the feet. On the four first segments there is a white lateral and longitudinal band, beginning from the head. Between that band and that of the opposite side there is a large brown patch marked by large brownish-black spots, and behind this on the middle segments there is a large white patch in the shape of a lozenge, which covers the back and a part of the sides, one of the angles of which reaches the first pair of membranous feet. On the middle of that band there are some brown spots. The posterior part of the body is covered by another large white patch marked anteriorly with some brown spots ; the lateral part comprised between the lozenge-shaped and the last white patch, is of a uniform dark brown color. It feeds on all the trees of the genus *Citrus*, and is in some parts of America a sort of plague to the cultivators of the orange.”

For a few days, while fresh food of *Dictamnus* was at hand, the larvæ did well and grew rapidly, but the supply failing, they were transferred to a young orange tree, which was enclosed in a gauze bag to prevent their escape, when they lost their vigor and activity, and although they ate more or less of the foliage every day, they lost flesh and one after another died, until only three or four remained. These lingered for a long time and two of them spun up and went into chrysalis, but the chrysalids were small and one of them deformed, and finally the remainder all died. Subsequently the chrysalids became stiff and hard, and on opening them they were found dead and dry.

Cresphontes has been taken on the wing at Chatham, 60 miles west of London ; also at the western extremity of the Province, at Amherstburgh. A dead specimen has also been found washed up on the shore of Lake Ontario, near Grimsby, but this is the first instance, as far as we know, of the larva having been found in Ontario.

Dictamnus belongs to *Rutaceæ* or the Rue family, under which there are also grouped in Gray's School and Field Botany the following genera and species : *Ruta*, Rue, sp. *Ruta graveolens*, common rue, exotic, but much cultivated in gardens ; *Zanthoxylum*, prickly ash, sp. *Z. americanum*, northern prickly ash, and *Z. carolinianum*, southern prickly ash, both indigenous ; *Ptelea*, hop-tree, sp. *Ptelea trifoliata*, indigenous ; *Skimmia*, sp. *S. japonica*, exotic from Japan, and *Citrus*, which includes both the

sweet and bitter orange, the lemon, lime and citron. In the south the larva feeds on the various trees belonging to this latter family. In the west it is said to feed on the prickly ash, and Prof. Snow says that in Kansas it feeds on the hop tree. Having now been found on *Dictamnus*, it becomes highly probable that the larva will also feed on *Rue* and *Skimmia*.

TINEINA.

BY V. T. CHAMBERS, COVINGTON, KY.

GELECHIA.

G. thoracefasciella Cham.

Sometimes the thorax is ochreous with a transverse brown band between the wings, instead of brown with an ochrey band, and the wings are blotched irregularly with ochreous. The proportion of the two colors varies.

G. ochrestrigella Cham.

In one specimen sent to me by Mr. Behrens the entire space from the end of the cell to the apex, between two of the discal branch veins, is brown.

G. obliquistrigella Cham.

Varies a good deal, without, however, altering the pattern of ornamentation. In a specimen now before me there is a distinct black dash near the apex in one wing, which is represented on the other wing by two minute dots. The base of the wing and the costal margin near it are nearly always brownish, and the other markings of the wings vary in their distinctness.

G. pravinominella.

I suggest this name for the species described by me under the name of *G. 4-maculella*, from Colorado, in the *Cin. Quar. Four. Sci.*, v. 2, p.

290. The species was named and described by me while in Colorado—away from libraries and collections—and the previous use of *4-maculella* was forgotten.

G. solaniella, ante v. 5, p. 176, and v. 4, p. 193.

The former accounts of this species are so meagre that I annex the following description :

Palpi simple; second joint more than half as long as the first.

Palpi grayish brown externally, more yellowish internally ; entire insect otherwise grayish brown and ochreous intermixed, microscopically dusted with white ; the ochreous and brown on the primaries take more or less the form of narrow longitudinal streaks, and the relative proportions of each color vary in different specimens, some being distinctly ochreous and others nearly brown. *Al. ex.* $\frac{1}{8}$ to half an inch. Kentucky.

Two specimens which I have received from St. Louis, from Miss Murtfeldt, are paler and more gray, with a distinct blackish dot on the fold about midway of the wing, and another small one between it and the costal margin which I have not detected in any of my specimens. These two specimens are also smaller than my own, but that they are of the same species is shown not only by their resemblance in other respects, but by the habits and appearance of the larvæ. The following account of the larvæ is furnished to me by Miss Murtfeldt, and agrees with my own observations, except that so far as I have observed, the entire larva turns blue when it is mature, while Miss Murtfeldt remarks it only of the first three segments. I have published a very brief account of the mine and larva, ante v. 5, p. 193, and the following is Miss Murtfeldt's account :

"The larva mines and crumples the leaves of *Solanum Carolinense*, turning them brown. Inside of the mine the larva inhabits a tough, silk-lined gallery, formed externally of frass. This gallery extends around the edge of the leaf until the latter appears as if a gathering string had been run between the tissues. The larva is nearly cylindrical, about 0.40 inch. in length, of a translucent green color, with transparent piliferous spots arranged in the usual transverse rows on the thoracic segments, and in the form of a trapezoid on the abdominal segments. Head and cervical shield bright brown, polished and edged anteriorly with whitish green. The thoracic segments turn blue when the larva is mature. Legs and prolegs short, yellowish green. The larva leaves the mine and pupates

on the surface of the earth in a slight cocoon, and the imago appears in about ten days, except the last fall brood, which hibernates in the chrysalis."

I have, as stated in a former number of the CAN. ENT., also received specimens of it from Texas. And *G. cilielineaella* only differs by the white lines at and in the ciliæ.

G. Hermannella.

In vol. 4 I have copied from the *Nat. Hist. Tin.* a description of this species; and in *The Ento. Mo. Mag.*, v. 11, p. 279, I have given an account of a variety found in Kentucky and Missouri, and probably further south, which I copy here for the benefit of American readers and for the purpose of adding some additional particulars. The specimens of the variety which I have bred—something over twenty—were from larvæ taken at various localities in Kentucky, and all that I have captured in Kentucky belong to the variety likewise, and Miss Murtfeldt writes to me from St. Louis that the variety only has been bred there. If the old, well-known form occurs at all in this latitude, it must be very scarce.

"So far as I can learn, no variety of this species has yet been found in Europe, though the species occurs from Lapland to Naples. Some three years ago I found the larvæ mining leaves of *Chenopodium* on the shore of Lake Michigan, lat. 43 deg. N.; and from them I bred several specimens differing in no essential particular from the figure in *Nat. Hist. Tin.*, v. ix., plate 8. Afterwards I often found them mining the same leaves in Northern Kentucky, lat. 38 deg. (nearly), but as I had as many specimens as I then wanted, and never thought of a variety, I did not attempt to breed them until the summer of 1874. The larva was the same, the mine was the same, and the mined leaves were of the same plant that I had found in Wisconsin, but, to my surprise, all the specimens that I have bred differ so decidedly from the ordinary *G. Hermannella* that probably any Entomologist would have considered them, if only captured, as of distinct species. Yet a little ingenuity on comparison of the specimens will show how the one pattern of ornamentation is readily resolvable into the other. One who knows this 'micro,' or the figure of it before mentioned, will remember the silvery fascia dark-margined on both sides, the small silvery spot before the fascia beneath the fold, and the larger one just above the fold behind the fascia. Now, suppose the dark margins of the fascia increased in quantity, especially the posterior dark margin

then suppose all the dark margin *behind* the fascia gathered on the costal margin, forming a velvety black spot so large that it touches the small silvery spot above the fold behind the fascia ; in like manner, suppose the anterior dark margin of the fascia gathered together in a velvety black spot *before* the fascia beneath the fold ; then suppose the fascia widely interrupted in the middle—and you have the variety. The costal part of the fascia thus becomes the anterior silvery margin of a large velvety-looking black costal spot, which, by its confluence with the silvery spot above the fold, appears to be margined with silvery at that point, and sometimes has a few silvery scales scattered through it ; and the dorsal portion of the fascia becomes the hinder silvery margin of a large velvety-looking black dorsal spot, which, by its confluence with the silvery spot beneath the fold, appears to be margined with silvery at that place, and sometimes contains a few scattered silvery scales. Except that the quantity of black and silvery scales is increased somewhat, the insect does not differ from the old form."

But, as I find by specimens bred and captured since the above was written, I have only described above the specimens which most nearly approach the old form, and the variety is by no means a constant one. As the fascia in the old form is a little oblique, so the anterior margin of the costal spot is nearer to the base of the wing than the hinder margin of the dorsal spot ; sometimes both spots are silvery margined entirely both before and behind, and sometimes also within ; and in one bred specimen there is no dorsal spot at all, but the dorsal margin from the base to the ciliae is silvery. There are some other more minute differences which it might be necessary to mention if one were describing a new species ; and perhaps where the word "silvery" occurs above it would be more accurate to write violaceous-silvery.

HAMADRYAS (Clem.)

H. Bassettella Clem.

The only variation that I have observed in this species is in the ground color, which ranges from sulphur to almost brick-red. It is abundant in all the Texas collections, and though originally described from Connecticut, I have never met with it in Kentucky or in Colorado.

PHÆTUSA.

P. plutella Cham.

The statement in the description of this species that the white streak

before the ciliæ is absent is incorrect. It should read that it is present.

EPICORTHYLIS Zell.

I copy the brief generic diagnosis from *Bei. Z. Kent.*, 1873, p. 48 :

Capitum depressum elongatum. Ocelli nulli. Antennæ crenulatæ. Palpi libiales porrecti, thorace multi longiores, articulo secundo sub-arcuato subtus lævis supra posticæ squamis erectis crestato; terminali setaceo, erecto. Haustellum brevissimum. Alæ anteriores angustæ, marginibus oppositis subparallelis; cellula media simplici, vena apicali furcata; posteriores anterioribus latiores, trapeziformes, margine postico infra apicem levitè impresso, vena mediana trifida. Tibiæ posticæ in dorso piloso-crestatæ.

E. inversella Zell.

Until I saw the species I supposed that it might be congeneric with *Sagaritis gracilella* Cham. It, however, seems to resemble it chiefly in having the tuft on the upper side of the second joint of the palpi. It is a heavier-bodied, clumsier-looking insect than *S. gracilella*. Prof. Zeller's specimens were probably a little worn, as he describes and figures the fore wings as having the spots arranged 1, 2, 1, as some of mine have them; but these are a little worn. The best specimens have large spots, or perhaps I might call them short transverse bands, arranged 1, 1, 1.

The species is dark gray, the scales tipped with hoary. The palpal tuft is whitish on its internal surface. Antennæ annulate with dark gray. The dorsal half of the fore wings is paler than the costal, and the disc is whitish or almost hoary, and behind this whitish part of the wing and not distinctly separated from it, is a whitish fascia concave towards the apex. The spots above mentioned are in the whitish discal part of the wing. *Al. ex.* about $\frac{1}{2}$ inch. It is as yet known only from Texas.

DESCRIPTION OF A NEW GRAPHOLITHA.

BY A. R. GROTE, BUFFALO, N. Y.

Grapholitha taleana, n. s.

♂. Fore wings brownish fuscous; under the glass the scales are seen to be blackish with white tips. Thorax concolorous. Fore wings with

three orange-ochre costal lines; the outer two ante-apical, outwardly oblique and joining a marginal line of the same color; the inner a little less oblique, just without the middle of the wing. The marginal line only extends to the outer border of a black patch situate below the median fold and containing four or five ochre dots. Fringes silky, concolorous with the wings. Hind wings a little darker than primaries, immaculate. Beneath concolorous brownish fuscous, with the exterior margins of both wings shaded with pale. Costa of primaries above at apices narrowly yellowish, enclosing fuscous streaklets. No costal fold.

Expanse 18 mil. Illinois, Mr. Thos. E. Bean, No. 630. Seems to be rather distantly allied to the European *arcuana*.

NEW NOCTUAE.

BY LEON F. HARVEY, M. D., BUFFALO, N. Y.

Agrotis Hilliana, n. s.

♀. All the tibiae spinose. Allied to *perconfusa*, but much brighter colored and with larger and distinctly annulated stigmata. Bright rusty ochre, shaded with lilac gray. A fine black basal streak reaches to the small black marginal claviform. Base of the wing ochreous, basal half line double, the inner line distinct blackish brown. Sub-basal space washed with lilac gray. Inner transverse line a little oblique, nearly straight with a slight outward curve below submedian vein on the margin, double, the outer line distinct, the inner fades out below costa. Median space rusty ochre; orbicular large, ochreous, with faint internal annulus, oblique, ringed with black; reniform similar in color, upright, very near the exterior line, which commences on the costa just above it. Exterior line lunulate, nearly straight, faintly indicated below costa. Sub-terminal space dark, washed anteriorly with lilac gray, contrasting with clear ochreous terminal space and fringes. Hind wings pale ochreous with faint lunule and double shaded lines. Abdomen above pale ochreous. Thorax rusty and dark. Head and collar pale ochreous. Palpi brown at

the sides ; third joint pale. Beneath ochre-yellow, powdered with red with faint markings. Abdomen and thorax beneath rusty brown.

Expanse 36 m. m. *Hab.* Lewis Co., N. Y. Collected by Mr. W. W. Hill, of Albany, after whom I take pleasure in naming this handsome species.

Polia diffusilis, n. s.

♂. Size large. Eyes naked, lashed. Tibiæ unarmed ; thorax with a mesial crest ; abdomen untufted. Antennæ with the joints prominent, brush-like, bristled beneath. Concolorous, dark gray, at first sight recalling *Apatela americana*. Median lines blackish, dentate and denticulate, approaching a little toward internal margin. No basal dash. Orbicular concolorous, small, rounded, oblique, dark ringed. Reniform renal in shape, dark ringed, touched outwardly with whitish, moderate, not quite upright. Subterminal line very deeply dentate, dividing the more blackish or fuscous blackish terminal space from the remainder of the gray wing. The median space is perhaps a little darker than the subterminal and basal spaces. The subterminal space is narrow, widening to costa, where there are four costal dots ; between veins two and four it widens ; it is cut into large gray teeth by the line. A fine black terminal line. Fringes gray, interlined. Hind wings concolorous whitish gray, shaded with fuscous. Beneath whitish gray with common line, and discal dot on hind wings. Head and thorax dark gray ; abdomen fuscous gray.

Expanse 52 m. m. *Hab.* Lewis Co., N. Y., July. W. W. Hill.

Tricholita fistula, n. s.

♂ ♀. Antennæ of the male pectinate, eyes hairy. Superior wings olivaceous, not tinged with red. T. a. line faintly visible, irregular ; t. p. line evident, waved. Subterminal space broad, lighter in shade, glistening. Orbicular spot concolorous ; oval, black margined, uniform, pipe-shaped bowl turned to the base of the wing, white, broken ; outer portion of costal margin cut with white ; fringes concolorous. Inferior wings fuscous, beneath arcuated line and discal spot ; fringes lighter in shade. Thorax concolorous, abdomen fuscous ; a black line on upper portion.

Expanse 32 m. m. No. 40, J. Behrens. *Hab.* California.

This species is congeneric with *T. semiaperta* Morr. It is the first Californian representative of the genus.

Copablepharon, n. g.

The genus resembles *Arsilonche* in the lashless naked eyes, and *Om-*

matostola somewhat in ornamentation and habit, though not in color. It differs from either in the spinose tibiae. It is the only form of the *Heliophilid* genera which has this peculiarity. The single species, *C. absidum*, was formerly referred by me to *Ablepharon* (= *Arsilonche* teste Staudinger). It is from California; one specimen before me is from Webber Lake, July 22, collected by M. v. Osten Sacken. The thorax and fore wings are pale lemon yellow, with the veins somewhat paler and accompanied by dark powderings. Hind wings and abdomen white; the former slightly dusted with fuscous and with a more or less evident mesial line of dots on the veins.

Heliophila amygdalina, n. s.

♀. Allied to *ligata*, but the wings are more almond-shaped. Costa curved. Eyes hairy. Of the usual pale testaceous ochreous color, with a brighter shading on the cell. Costa broadly whitish rosy gray; veins obsoletely pale marked. The t. p. line is expressed by a continuous series of venular black dots, running more inwardly obliquely below vein 4 than in *ligata*. Hind wings white, very slightly soiled. Abdomen and thorax pale ochreous. Beneath the whitish hind wings show a terminal row of black points; the ochrey primaries a black mark at the ception of the exterior line on costa.

Expanse 34 m. m. *Hab.* Orono, Maine. Prof. Fernald, Coll. B. S. N. S.

Caradrina subaquila, n. s.

♂ ♀. Closely allied to *conviva*, but the thorax and fore wings are of a bright brown, somewhat purply. The terminal space pale, somewhat ochrey, and in one specimen broken into spots. The lines and spots as in *conviva*; the reniform resolved into two blackish points, more or less prominent and faintly pale ringed. Hind wings and fringes white; the former more or less soiled exteriorly.

Expanse 23 m. m. *Hab.* Bostrop Co., Texas. M. von Meske.

Caradrina clara, n. s.

♀. Fore wings and thorax blackish brown, paler shaded. Veins on primaries obsoletely powdered with white. Median lines sub-obsolete; the inner almost wanting; the outer geminate, shaped as in *grata*, and like as in that species, very near to the white marked narrow reniform.

Orbicular wanting. Fringes concolorous. Hind wings pale yellowish white, sub-pellucid. Beneath with distinct discal black spot visible above; a dark waved exterior line and indications on costa of a sub-terminal line; costal region shaded with fuscous. Fore wings dark with a waved perpendicular exterior line and a sub-obsolete sub-terminal line.

Expanse 26 m. m. *Hab.* Texas. M. von Meske, No. 2,611.

Graphiphora rubrica, n. s.

♀. Thorax yellowish fuscous or gray. Collar marked by a faint black line. Superior wings of a yellowish gray, suffused sometimes with a ruddy brown tinge; a black dash at base of fore wings. T. a. line geminate, waved; outer line black, more prominent on inferior border. T. p. line geminate, faintly black, commencing on costa above the reniform, boldly exerted and passing to the inferior border of wing directly in a line with the internal border of the reniform and terminating in a black dash. Sub-terminal commencing with a yellowish white apical patch and continuing as a clearly cut even yellow line to the inferior angle; orbicular spot oval, concolorous, light annulus, oblique; reniform concolorous with a black spot in the lower portion, light ringed, with inner margin most expressed. Costal margin with black and white markings; fringes concolorous with sub-terminal line; inferior portion of wings nearly concolorous with thorax. Inferior wings whitish, discal spot and arcuated line black; terminal line a series of black dashes; beneath same lines, only more marked.

Expanse 32 m. m. *Hab.* Rafael, Cal., April, No. 4, M. v. Osten Sacken.

The distinctive character of this species is the pale even sub-terminal line arising from a pale apical patch.

CORRESPONDENCE.

EGG-FEEDING MITES.

DEAR SIR,—

In the February number (p. 22) you quote Dr. Hagen as saying that "in the whole European literature I have not been able to find anything

about Acari eating eggs, so the fact seems new and is very important." The *Dermaleichus* figured in my 5th Mo. Rep. (p. 87) feeds upon the eggs of *Mytilaspis pomicorticis*, as well as upon the insect proper under the scale. In fact I find it more often feeding on the eggs. Dr. Packard long since observed and figured a mite (*Nothrus ovivorus*) that preys on the eggs of the Fall Canker-worm (*Anisopteryx pomelaria* Harr.); while the beneficial effects of the Locust Mite (*Trombidium locustarum*) in destroying the eggs of the Rocky Mountain Locust have been frequently referred to of late years in my Reports, and recently in the February number of the *American Naturalist*.

C. V. RILEY.

St. Louis, Mo., March 8, 1878.

ARCTIA ANTHOLEA, Boisd.

DEAR SIR,—

Assuming that the figure of this species given in Stretch's *Zygaenidæ* and *Bombycidæ*, plate 3, fig. 8, is correct, and I have no doubt of it, then this species is identical with the European species, *Euprepia judica* Esp., and as this name has priority, *antholea* falls.

W. V. ANDREWS, Brooklyn, N. Y.

CATOCALA MARMORATA.

DEAR SIR,—

Three good specimens of *Catocala marmorata* were collected by me at sugaring the latter part of August last, and also one fine specimen of *relicta*.

S. H. VAN WAGENEN.

Rye, Westchester Co., N. Y., Jan'y 29, 1878.

SAMIA COLUMBIA.

DEAR SIR,—

From cocoons of *columbia* kindly sent me by Mr. Anson Allen, of Orono, Maine, "found on larch trees many feet from the ground, where

they would be exposed to all the changes of winter weather," a single male escaped in the warm room where I kept the chrysalids. I found the specimen February 14th, but it had broken its wings, and I have no doubt it escaped one or two days previously. I had no immediate expectation of the chrysalids hatching, and hence did not examine the cocoons daily. I think it worthy of record that this species has the peculiar smell characteristic of *cecropia*.

A. R. GROTE, Buffalo, N. Y.

DEAR SIR,—

I would like to refer to a statement of a correspondent (in July No. of ENTOMOLOGIST) regarding the appearance in large numbers, in the vicinity of this city, of *Melitaea phæton*. Although collecting nearly every day during the summer, I did not observe a single specimen of this butterfly, nor have I seen one collected by any one else. *M. tharos* is one of our most common butterflies; perhaps this was the one intended.

W. H. HARRINGTON, Ottawa, Ont.

DEAR SIR,—

In the summer of 1876, while examining the paper bands placed in our orchard to entrap the larvæ of the Codling Moth (*Carpocapsa pomonella* Linn.), I found quite a number of their larvæ and chrysalids apparently eaten by some *cannibal*, which, after close watch, proved to be *Tenebrioides laticollis* Horn. On several occasions I found them half way into a fresh chrysalis of *C. pomonella*.

This beetle, as well as *T. castanea* Mels., is very common here, and I will try to encourage this useful taste of theirs.

CHARLES D. ZIMMERMAN, Buffalo, N. Y.

DEAR SIR,—

Four specimens of *Papilio cresphontes* were captured in Fairfield Co., Conn., last summer, about the 25th of July. Others were seen

GEO. W. PECK.

New York, March 10th, 1878.

The Canadian Entomologist.

VOL. X.

LONDON, ONT., APRIL, 1878.

No. 4

NOTES ON THE LARVA AND CHRYSALIS OF NEPHELODES VIOLANS.

BY G. H. FRENCH, CARBONDALE, ILL.

During the last of April and through the month of May, 1877, I found the larvæ of this moth in grassy places in Washington County, Illinois. When full grown they were 1.75 inches long, robust, the head four-sevenths the width of the middle of the body. The color of the under side yellowish gray. Above the line of the lower part of the stigmata, four broad dark brown stripes alternating with three narrow grayish yellow ones, the latter in the dorsal and sub-dorsal regions, and much lighter at the extremities of the body. Head gray, mottled with brown, brown border to the inner part of eyes. Cervical shield very dark brown, crossed by dorsal and sub-dorsal light lines. No hairs noticeable except with glass.

Changed the fore part of June, under ground, to dark brown chrysalids, .80 of an inch long, very thick through the central part, rapidly tapering to the next and so on to the last segment. The terminal segment nearly cylindrical, rough, joined to the back part of the preceding, tipped with two short, diverging bristles. Imagines appear about the middle of September.

While in confinement fed freely upon corn, grass and *Polygonum aviculare*. They fed mostly at night, remaining concealed during the day time, either under the rubbish of the box, or in the dirt, resembling in this respect the cut worms (*Agrotis*, etc.)

THE BEATING NET.

BY JAMES S. BAILEY, A. M., M. D., ALBANY, N. Y.

The uses of the beating net are obvious and can at once be appreciated in the collecting of Coleoptera and larvæ. A convenient and simple form is here presented, with directions for its construction.

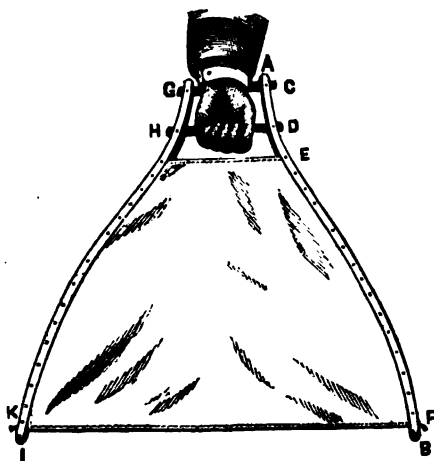


Fig. 2.



Fig. 3.

This particular form of net was invented and presented to me by my friend, Mr. T. B. Ashton, of Tonganoxie, Kansas, who has not only distinguished himself as a Coleopterist, but has shown himself to be an excellent mechanic.

By grasping the net with the left hand, as shown in fig. 2, thrusting it under a shrub, and giving the bush a quick shake, or blow with a walking-stick, every living thing upon it will instantly fall upon the apron of the net. If Coleoptera, they can be secured with the fingers or a small net held in the other hand for that purpose. If caterpillars, they can be gently rolled into a receptacle prepared for them.

The frame work is made of well seasoned hickory. The sides, A, B and G, I, are composed of strips 37 inches long and $1\frac{1}{4}$ wide at the ends A and G, and tapering uniformly until they are $\frac{5}{8}$ of an inch wide at the other ends, B and I. Each piece should be $\frac{1}{2}$ inch thick when dressed. After these pieces are steamed or boiled in water until thoroughly pliant, the wider ends A and G can be placed together and securely fastened in a vice, the free ends B and I separated widely and a block of wood forced between at the point E, and securely fastened, while the ends B and I can be secured with a piece of strong twine until dry enough for the frame, to maintain its shape. Then the sides should be sand-papered until smooth and two holes bored in each piece for the rounds G, C and H, D to pass through; for this purpose a half-inch bit will be sufficient, its point being inserted in the stick $\frac{3}{4}$ of an inch from the end of the widest part C, G, and again $5\frac{1}{4}$ inches at D, H. A round should be turned of the same material to fit the hole, and should be $6\frac{1}{2}$ inches in length. The other round must be of the same size and $8\frac{1}{2}$ inches long. One end of each round can now be fastened into one side piece by a hickory peg $\frac{1}{8}$ of an inch in diameter; the other side is fastened in the same manner, but the pegs on this side must be fitted so that they may be taken out to enable the net to be folded for transportation.

Now that the frame work is constructed, each side must be ripped centrally with a saw for 29 inches, commencing at the point B and extending to E. Through this slit a piece of unbleached domestic cloth must be drawn, a hem $\frac{3}{4}$ of an inch wide having previously been made across the ends at the points E and F. Fourteen screws are now inserted into each blade two inches apart, which will hold the sheeting firmly and form the apron. The outside edges can now be cut closely to the frame work with a sharp knife. Previous to this operation a stout twine should be passed through the hem at the points F, K, and a knot tied at each end, but the twine should be an inch or two shorter than the apron, which will cause it to sag and better hold its contents. Where the twine passes through each side piece a gimlet hole $\frac{1}{8}$ of an inch in diameter must be made to accommodate the twine.

The drawing is introduced not only to assist in constructing the net, but to represent the manner of handling it when collecting. Fig. 3 represents the net folded for transportation.

LARVAL AND PUPAL HISTORY OF DARAPSA VERSI-COLOR HARRIS.

BY GEORGE D. HULST, BROOKLYN, N. Y.

Last summer I was so fortunate as to obtain fifty eggs of the rare Sphinx, *Darapsa versicolor*. They were found between June 26th and July 20th, on the under side of the leaves of the common swamp button bush, *Cephalanthus occidentalis* Linn., and, with two exceptions, were laid singly. The egg is round and slightly flattened—about the size of rape seed. It is at first light green and translucent, afterwards milky and opaque; a few before hatching became, about the spot where the larva emerged, russety. The longest any egg continued without hatching was six days, and it is almost a certainty that the duration of the egg state is seven days.

The larva, just emerged, is a uniform pale white, three lines in length. The caudal horn, from four to five hours after the emerging of the larva, becomes dark purple. The caterpillar gradually becomes pale green. The first caterpillar hatched June 27th, and completed its first moult early July 2nd. The moult occupied about 30 hours.

After First Moult—Length 6 lines. Head nearly spherical, with greenish tint. Body linear, light green in color. A lateral whitish line extends from the mouth to the caudal horn, which, as the age advances and size increases, is revealed to be composed of several lines as follows: A sub-dorsal line extending from each side of the mouth to the upper part of the eyes, and thence back to the rear of the 4th segment of the body; a similar line runs obliquely from the lower part of the 4th segment, under and just including the stigmal point, upwards and backwards to the rear of the 5th segment, meeting it just below the dorsal line. This is followed by five other and parallel lines, each beginning and ending one segment further back, except the last, which extends across the three last segments up to the base of the caudal horn. There are faint indications of other lines at the lower part of the 10th and 11th segments. The caudal horn is a violet purple, becoming towards the end of the age lighter in color, and during the age is always held parallel with the body. The second moult was completed early July 6th, occupying about 24 hours.

After Second Moul—Head and body light green. Body finely granulated ; markings as before, but more distinct. Stigmata marked by red points. Caudal horn reddish, darker in front and behind than on the sides. During this age the head almost ceases to develop, so the body increases rapidly in size from the head to the fifth segment. The third moult ended July 10th, occupying about 30 hours.

After Third Moul—Head somewhat triangular, and with the body green. Markings as before. Fore legs pink. Stigmatal points red ; body covered with granulations, and much swollen at 4th and 5th segments. Caudal horn straight, greenish white in front and behind, almost white on the sides. The fourth moult ended early July 16th, occupying about 40 hours.

After Fourth Moul and Mature Larva—Head small, somewhat triangular and elongate. Head and first four segments yellowish green ; the rest of the body pea green. Markings as before, without granulations, which have become white specks. The body more heavily marked with these on either side of the back, forming a green dorsal line. Stigmatal marks red, oval, with yellow point at each end. Horn stout, curved backward, sharply pointed, black in front and at the end, red on the sides.

About one in five varies from this normal form in having the ground color a pinkish brown instead of green. The shadings are then pinkish white.

The larva when full grown is from $2\frac{1}{2}$ to 3 inches in length. It becomes bluish black before pupating, and several, before leaving the food plant, were noticed rubbing the mouth over the entire body as if covering it with saliva. The food plant was left during the night, July 21st–22nd. The pupation was on the ground under leaves, in a slight cocoon made by drawing together leaves and grains of dirt with some silk. The larva became a pupa in from three to four days after leaving food plant.

The pupa is of a dirty light brown color, with dark chocolate brown spots—these almost covering the wing cases and anterior parts. The eyes and stigmata are black. The pupa is, as well, black between the segments.

The imago appeared Aug. 12th. The later broods remain in the pupa state of the same early brood ; some emerged ; others, exposed to the same conditions, remain pupæ.

The larva from the beginning is very quiet in its habits, never leaving a stem of the food plant so long as a leaf remains. In eating it always hangs from the mid-rib of the leaf below (or, when small, from one of the minor ribs), and eats usually from the extreme end, finishing a section across the leaf as it goes. It generally eats midrib and petiole down to the woody stem. It is easily reared and will endure almost any hardship. Like others of our Sphingidæ, it is but partially double-brooded on Long Island.

NOTES ON THE EARLY STAGES OF SOME MOTHS.

BY L. W. GOODELL, AMHERST, MASS.

Euloncha oblimita Grote.

Larva, one specimen—Body black; a broad coral-red band on the back of each ring and a row of bright yellow blotches on the sides. The black ground color is variegated with white on the sides. On each ring are ten small warts, each of which bears about eight short, stiff, spreading brown spines, which sting severely when touched. Head roundish, coral-red, with two brown spots on the crown. Length when full grown, 1.4 inches. Feed on the smooth alder (*Alnus serrulata*). Changed to a pupa within a tough cocoon attached firmly to a twig. Imago June 6.

I am indebted to Prof. A. R. Grote for the identification of this species, and to Dr. A. S. Packard, jr., for the following Geometrids:

Eumacaria brunnearia Pack.

Larva, eight specimens—Body smooth, stout and uniform; black with a large, indistinct, grayish blotch on each side of the five middle segments. Head black, as wide as the body, not bifid. Length when full grown, 0.6 to 0.7 of an inch. Feeds on the apple tree. Pupated Aug. 30th to Sept. 15th.

Pupa—Length 0.33 to 0.42 inch; dark brown; subterranean. Imago early in June.

Eubyja cognataria Guen.

Larva, two specimens—Body thick and of uniform width, carinated on the sides; brown tinged with olivaceous and punctated with dark brown, thickest on the back and anterior part of the segments. On the first ring are two small angular tubercles, and two still smaller sub-dorsal conical ones on the 8th. The 11th segment is slightly humped and on the back are two large, kidney-shaped, pale ochreous spots, which are edged with dark brown; and there are two small dorsal grayish spots on the anterior part of each ring. The tubercles on the first ring are brown tipped with reddish, and those on the 8th are gray thickly spotted with black. Spiracles red. Head sub-quadrate, deeply bifid, with a crescent-shaped indenture in the middle of the front; color yellowish brown, banded with darker brown and the lobes tipped with dull red. Feeds on apple and pear trees. One specimen became fully grown Aug. 18th, and the other Sept. 16th, and measured respectively 2.3 and 2.4 inches in length.

Pupa—Length 0.7 inch, obtuse, dark shining brown; subterranean. Imagines last of June.

Cymatophora crepuscularia Pack.

Larva, one specimen—Body smooth and of uniform thickness; pale yellow on the sides, shading to creamy white above; a straight, light brown stripe on the back, and below this, situated close together, are several narrower, wavy, dark brown stripes. All the stripes are obsolete on the last segment. Head roundish, a little wider than the body and reddish brown in color. Venter bluish white. Found May 30th, on the plum tree. Length when fully grown, 1.3 inches. Pupated June 6th.

Pupa—Length, 0.5 inch, of the usual form and color; subterranean. Imago June 19th.

NEW SPECIES OF ACOPA AND HELIOTHIS, AND NOTE
ON HAMADRYAS.

BY A. R. GROTE, A. M.,

Director of the Museum, Buffalo Society Natural Sciences.

In *Acopa carina* Harvey, from Texas, the accessory cell on the primaries is smaller than in a new species which I have received from Prof.

Snow from Southern Kansas. In this genus the body is linear and slight, tibiae unarmed, ocelli small, male antennae brush-like with distinct joints, thorax with a tuft behind, abdomen untufted, linear. Fore wings 12-veined with accessory cell, from the outer apex of which spring veins 7 and 8; 9 out of 8, a long furcation to costa. Hind wings 7-veined; median vein 3-branched; 8 out of 7 not far from the base. Primaries with oblique outer margin and produced apices. Front with a clypeal plate. Labial palpi narrow, linear, im prominent; legs slender, tibiae unarmed.

Acopa perpallida, n. s.

♂ ♀. Larger than *carina*, with white secondaries. Primaries white, shaded with ochrey and with narrow fuscous lines. Basal line indicated; anterior line upright, forming two large teeth; outer line denticulate, outwardly produced opposite the cell; orbicular obsolete, reniform concolorous, obscured by a dark shade. Subterminal shade line fuscous, even, continued to vein 7 from internal angle, above which it appears as an inwardly oblique shade from costa to vein 7. A terminal interrupted line; fringes white. Hind wings white, very slightly soiled, with discal mark and in distinct line; fringes white. Beneath yellowish white, shaded with fuscous on primaries; fringes white. Body whitish. *Expanse* 28 mil.

The median lines on primaries are further apart than in *carina*. This species was sent me by Prof. Snow under the number 504.

Heliothis nuchalis, n. s.

♂. Wings ample; body comparatively slight. Eyes naked. All the tibiae armed; fore tibiae with an inner terminal spine and an outer one of same size, the latter followed by two smaller spinules. Fore wings with pale whitish ochrey ground, much shaded with fuscous. All three stigmata present, very large, sub-equal, and dark. The reniform has an internal annulus and a central pale streak, likewise the smaller rounded orbicular; the broad claviform is cut by the narrow submedian shade. Posterior line narrow, fuscous, angulated on subcostal vein, roundedly produced opposite cell, interrupted by the pale marked veins. The terminal fuscous field is cut by the whitish subterminal shade; fringes dark. Hind wings whitish ochreous, with thick discal mark, central discally angulated line and with a series of irregular pale interspaceal blotches cutting the fuscous terminal shading of the wing; fringes white, interlined at base. Beneath whitish with faint ochrey tinge. Discal marks large,

black, distinct on fore wings. Outer line narrow, distinct, discally bent ; subterminal shading obvious. On the secondaries there is a discal mark, a central narrow uneven line and terminal shading ; fringes white with faint interline. On fore wings the fringes are here whitish at base. Body whitish beneath, above fuscous. *Expanse* 33 mil. Prof. Snow, Kansas, number 371.

This species is wider winged and smaller bodied than *cupes*, differs by the presence of the large claviform and in the armature of the fore tibiæ. The fuscous margin of the hind wings above is much more broken up with pale blotches than in *umbrosus* and *phlogophagus*.

Fam. TINEIDÆ.

For Dr. Clemens' genus *Hamadryas*, preoccupied in the Lepidoptera by Hübner and Boisduval, I propose the generic name *Euclementia* for *E. Bassettella*.

NOTES UPON GRAPTAS COMMA AND INTERROGATIONIS.

BY W. H. EDWARDS, COALBURGH, W. VA.

I. COMMA ; dimorphic forms HARRISII and DRYAS, both figured in But. N. A., Vol. 1.

In CAN. ENT., v., 184, Oct., 1873, I gave the result of breeding this species from eggs laid by the form *dryas*, viz., 6 *dryas*, but many more of *Harrisii*, establishing the dimorphism. Since that time I have raised several broods from the egg, and both before and after 1873 recorded in my journal the history of several lots of larvæ found by me. I have therefore some material for illustrating the peculiarities of the species. At Coalburgh there are three broods annually, and the butterflies of the third brood hibernate. The hibernating females deposit their eggs last of April or early in May, and the first brood of the butterflies emerges from chrysalis about 1st June ; but should the weather be cold during May, then from the middle to last of June.

The second laying of eggs occurs in July, between 15th and 30th, and the butterflies from these appear last of Aug. or first of Sept.

And the third laying occurs in September, the butterflies therefrom emerging in October. The several broods are accelerated or retarded in their periods by the weather, great heat quickening every one of the preparatory stages.

So far as I know from breeding, or from very extended observations in the field, the last laying of eggs produces *Harrisii* only, and the series therefore begins in the spring with eggs laid by that form.

The result of the eggs laid by *Harrisii* has in all cases been *dryas* only, with a single exception, when one *Harrisii* ♂ emerged.

The next brood of the season, the eggs having been laid by *dryas*, has sometimes consisted wholly of *dryas*, but again, as in the instance recorded in the ENT., and first above mentioned, of both forms, *Harrisii* considerably outnumbering *dryas*.

The third brood, from eggs laid by *dryas*, has resulted in *Harrisii* wholly, and closed the season.

Harrisii is the winter form of the species, and *dryas* the summer. The first brood of the summer is *dryas*, and were the season here as short as it is in the Catskill Mountains of New York, these two broods would comprise the whole round. In the Catskills the first eggs are laid in June, a full month after the first are laid in Virginia, and the butterflies emerge in July, all *dryas*, and eggs laid by these produce *Harrisii* in August, and this form hibernates. So that the two northern broods correspond with the first and third southern broods, and the second brood at the south is the interpolated one, and consists of both forms of the species. In some years *comma* is excessively common here in October and November, and in no season is it rare. I give a statement of results obtained :

FIRST BROOD : Eggs laid by HARRISII.

1871—Between 10th and 18th May, found larvæ. Result from 20th May to 2nd June—7 *dryas*.

1873—20th May, found larvæ. Result about* 12th June—4 *dryas*.

* I. e., a few days before and after the date named.

1874—10th May, obtained eggs from ♀ *Harrisii* in confinement.
Result about 27th June—34 *dryas*.

1875—14th. May, obtained eggs from ♀ *Harrisii* in confinement.
Result about 18th June—19 *dryas*.

1869—18th June, obtained from chrysalis 1 ♂ *Harrisii*.

This last is the only exception to the rule which I have noticed.

SECOND BROOD : Eggs laid by *DRYAS*.

1873—30th July, obtained eggs from *dryas* in confinement. Résult
about 2nd September—6 *dryas*, many *Harrisii*.

1875—29th July, obtained eggs from *dryas* in confinement. Result
about 24th August—5 *dryas* only.

THIRD BROOD : Eggs probably laid by both forms.

1870—Last of Sept., found 70 larvæ which must have come from eggs
laid early in Sept. Result, in Oct.—all *Harrisii*.

I have never taken or observed an example of *dryas* in the fall or in the spring after hybernation. This form is recognizable at sight, as both sexes have the hind wings black on upper side, whereas in *Harrisii* these wings are red.

II. INTERROGATIONIS ; dimorphic forms *FABRICII* and *UMBROSA*, both figured in But. N. A., Vol. 1.

I have raised several broods of this species, obtaining eggs by confining the females, during the past six years, and have also recorded the results obtained from eggs or larvæ found. There are at Coalburgh three full broods annually, as with *comma*, but there is an effort towards a fourth, more or less successful, depending on the length of the season or the temperature in the fall months. Some individuals hibernate, and the females so surviving lay their eggs in the last days of April or early in May. From these eggs come butterflies last of May or first of June.

The second laying occurs early in June and the butterflies therefrom appear early in July.

The third laying takes place last of July and the butterflies appear in September, some as early as first, others late in the month. The females of this brood, which is the third of the year, or some of them, lay eggs about middle of September and the butterflies emerge in October. But

the larvæ now are apt to be caught by cold weather and destroyed, or their food plant is cut off, so that few can reach chrysalis. Once in the chrysalis stage they are safe, and sooner or later, as the weather may permit, the butterflies will emerge. I am inclined to think that the butterflies of the third brood do not hibernate, and that the continuance of the species here depends on the few individuals which survive from this fourth brood. In no other way can I account for the scarcity of this species as compared with *comma*. Both these species feed on same plants, hop, early in the season, then nettle and *Boehmeria*, then *Celtis* and elm, and neither suffer to any extent from parasites. But *comma* is fifty times more abundant than *interrogationis*, and in the spring while many of the former are seen, I rarely see an *interrogationis*. In midsummer and early fall this last becomes common, and if the individuals of the third brood generally hibernated, surely the species ought to be common in the spring. If *umbrosa* ever passes the winter here I have failed to discover it. All the spring examples noticed by me have been *Fabricii*.

First Brood—The eggs obtained from ♀ *Fabricii* in April gave in May 21 *umbrosa*, no *Fabricii*.

The results of the next succeeding, or second, brood have been variable, just as in second brood of *comma*, and both forms have appeared from eggs laid by one female.

The result of the third brood has also been variable, both forms resulting. This, therefore, differs from the corresponding brood of *comma*, in which all the butterflies were of the one form, *Harrisii*.

The only examples of the fourth brood raised by me to imago came from larvæ found on elm 10th October, and when found were past third moult. They must then have proceeded from eggs laid about the middle of September. The chrysalis period was much protracted, but in December there resulted 4 *Fabricii*, no *umbrosa*. I have, however, in several years seen the larvæ of this brood late in the fall. As some individuals of every brood of any species of butterfly appear earlier than the average time and others later, so individuals of this fourth brood of *interrogationis* doubtless appear early enough in the fall to ensure early hibernation. And if the chrysalis stage is reached the butterfly is sure to emerge at last unless destroyed by a parasite or an enemy. In the case of *comma*, when compared with the behavior of that species to the northward, where there are but two annual broods, it is the second brood which is interpolated in

this region. In the case of *interrogationis*, when compared with the species northward, it is the second and third broods which are interpolated in this region, and when compared with *comma* of this region, it is the third brood of *interrogationis* which is interpolated. To the southward the fourth brood would have ample time to reach the imago before winter set in, and the species should be as abundant, where the food plants are found, as *comma* is here.

I say nothing of *interrogationis* in the Northern States, because I find nothing immediately bearing on the periods of the broods in my note books, and by correspondence I have failed to obtain special information. I simply know from experience that in the Catskills there are two annual broods, but whether the hybernating individuals are altogether *Fabricii*, or whether the brood which proceeds from these is wholly *umbrosa*, I do not know and cannot learn. I think *Fabricii* will be found to be the winter species there, and *umbrosa* the summer, but this is conjecture. I hope some lepidopterist at the north will examine this matter and report.

I give a statement of results obtained :

FIRST BROOD : Eggs laid by *Fabricii*.

1877—28th April, obtained eggs from ♀ *Fabricii* in confinement.
Result about 4th June—21 *umbrosa*.

I had watched for years for a ♀ *Fabricii*, but this was the only one I was ever able to take.

SECOND BROOD :

1871—4th June, eggs laid by *umbrosa* in confinement. Result about 1st July—11 *umbrosa*, 6 *Fabricii*.

1869—5th June, found larvæ. Result about 25th June—26 *umbrosa*, no *Fabricii*.

1873—June, found larvæ. Result last of June—19 *umbrosa*, no *Fabricii*.

1870—4th July, found eggs. Result 10th August—1 *umbrosa*, 2 *Fabricii*.

THIRD BROOD :

1871—1st August, confined 11 *umbrosa* and obtained multitudes of eggs. Result 1st September—63 *umbrosa*, 34 *Fabricii*.

1877—15th August, from eggs of *umbrosa* in confinement. Result about 22nd September—2 *umbrosa*, 9 *Fabricii*.

1870—1st August, found larvæ. Result 13th September—6 *umbrosa*, 16 *Fabricii*.

FOURTH BROOD :

1872—10th October, found larvæ past third moult. Result 8th to 18th December—4 *Fabricii*.

MICRO-LEPIDOPTERA.

BY V. T. CHAMBERS, COVINGTON, KY.

TORTRICINA.

It is not my purpose to enter upon the difficult field of this family. My acquaintance with the literature of the subject, and with the characters of the multitude of very unnatural genera into which it has been in modern times divided, is too limited to justify me in so doing ; the more especially as Prof. Fernald is now working it up. But the two species mentioned below are sufficiently interesting to induce me to publish the following observation upon them.

EXARTEMA, Clem.

E. fagigemæana, n. sp.

A single specimen of this species is in the Museum at Cambridge, labelled *Coleotechnites fagigemæana*, by which name it stood in my cabinet before it was recognized as an *Exartema*. Prof. Fernald having examined it, informs me that it is a true *Exartema*, which genus, though withdrawn by Dr. Clemens, is retained by Zeller.

Palpi ochreous, with terminal joint brown, and with two small brown spots on the outer and one on the inner surface of the second joint. Head ochreous, with a dark brown line across the vertex between the antennæ ; eyes green ; thorax ochreous, stained with fuscous on the dorsal surface ; fore wings from the base to beyond the middle sordid olive green, the

remaining portion brick red, both portions being marked with silvery gray or silvery white, according to the light, and the basal third entirely suffused or overlaid with the silvery hue, except three spots, one of which is just within the dorsal margin, another oblong larger one is within the costal margin and a much larger elliptical one is on the fold. From the silvery part of the wing, at about the middle of the disc, a silvery streak curves obliquely backwards to the brick red color at the fold, where it intersects another silvery streak, which leaves the dorsal margin before the ciliae (at the junction of the olive green and brick red) and curves obliquely backwards to a point in the middle of the apical part of the wing, where it intersects still another silvery streak, which leaves the apical margin near the hinder angle and curves obliquely forwards to a point within the costal margin at the junction of the olive green and brick red colors. On the costal margin, and opposite to the end of the last mentioned streak, is a small ochreous spot, and in it begins another silvery streak which curves obliquely backwards to the apical margin before the apex, running nearly parallel to the last above-mentioned silvery streak, and being intersected by a small costal silvery streak which also arises from a small costal ochreous spot; further back are two other small costal ochreous spots, each of which contains a small black line. Ciliae dark bluish brown, with two ochreous spots *beneath* the apex, and a dark brown hinder marginal line at the base, before which is an indistinct line of black atoms. From about the basal third of the wing length to the apex the *extreme* costa is dark brown interrupted by ochreous spots, and the basal third is ochreous interrupted by three or four dark brown spots. Thus the basal half of the wing is olive green suffused with silvery, except upon the three spots before mentioned, while the apical half is brick red divided by anastomosing silvery lines. Under a lens the silvery parts of the wing appear to be dusted with brown.

The hind wings are fuscous, pale at the base, deepening towards the apex. Ciliae yellowish silvery with a dark brown hinder marginal line at the base. Abdomen dark brown above, ochreous below. Legs ochreous, the first pair dark brown on their anterior surfaces, and the tibiae of the hind pair fuscous on their anterior surfaces; tarsi dark brown on the outer surface, annulate with fuscous. *Al. ex.*, ♂, $9\frac{1}{2}$ lines; ♀, 8 lines. Kentucky.

This insect is chiefly interesting from its larval habits. I have known the larva long, and it is mentioned, I believe, in a previous paper in the

CAN. ENT. It is sordid yellowish white, with the head piceous and the next segment stained with fuscous. It feeds inside the leaf buds of the beech (*Fagus sylvatica*), and when it has well eaten out the contents of one bud, it cuts it off at the base, and using it as a case, travels off to another bud, to the apex of which it affixes its case and proceeds to eat out this bud also, and then cuts it off, as it had done the first, and proceeds to another bud. I have known it to attach four buds together in this way, thus making a case nearly two inches long. It pupates in its case, which it attaches to a leaf, and the imago emerges in Kentucky in the latter part of June.

BRENTHIA, Clem.

B. pavonacella Clem.

Not having seen Dr. Clemens' specimens, and being unable to recognize my bred specimens in any descriptions by him or any other author within my reach, I had proposed to describe this species as new under the name of *Microæthia amphicarpeana*, and specimens so labelled are in the cabinets of various Entomologists. Prof. Fernald, however, on comparison with Clemens' types, recognizes my specimens as identical therewith. I have no doubt this determination is correct, though having again examined Dr. Clemens' description, it seems to me singularly incomplete.

In the "Tineina of North America" (Mr. Stainton's republication of the Clemens' papers) p. 134, Mr. Stainton, who had seen Dr. Clemens' types, writes that it is "probably a *Simaethis*," and at p. 41, again, that he is disposed to consider the insect "not a *Tineina*, but one of the *Pyralidina* allied to *Simaethis*"; and on p. 38, Dr. Clemens states that having "examined a specimen of *Simaethis*, I must acknowledge that *Brenthia* seems congeneric with it"; but he thinks its proper location is among the *Tineina*, and not the *Pyralidina*. Zeller refers *pavonacella* Clem. to *Choreutis*, which is Stephens' section "A" of *Simaethis*. The species appears to me to have some decided affinities with the *Tineina*, but upon the whole to be rather referable to the *Tortricina*.

Dr. Clemens mentions that it has the habit of "strutting about on leaves," but Mr. Stainton "has never observed this habit in any of the English species." The appearance of the insect in repose is decidedly *strutty*, and full of self-importance. A human being who would make the same effort to display his or her adornment, would subject himself to a well-founded charge of egregious vanity, but perhaps the insect is no more

chargeable with vanity than is a peacock. I have, however, never seen it strut about on a leaf, and after having bred a great many specimens, I do not believe that it can walk or run. At all events, I have never seen it do either, its modes of progression being by flight or by little jumps. It sometimes jumps more than an inch at a time, that is, about six times its own length. It is the only insect that I can now call to remembrance which has the under side of the wings of both pair as gaily ornamented as the upper side, and which manages to make a full display of its entire ornamentation of body and wings at one and the same time. It does this in the following manner: The fore wings, without being laterally extended, are elevated so as to display anteriorly the ornamentation of their upper surface, and posteriorly that of their lower surface; at the same time the hind wings pass out beneath them at the side, and fully expanded, getting a twist at the base which brings the costal margin up and the dorsal margin down, so that the ornamentation of their upper surface is displayed in front, and that of their under surface behind. The under surface of the wings are rather more gaily ornamented than the upper. This is its position always in repose, and the ornamentation of the abdomen is also thus exposed. I have bred both ♂ and ♀, and observed no difference between them either in ornamentation or position.

The larva is very pretty. It is pearly white, prettily spotted with piceous, with the integument somewhat indurated. It attains a length of more than one-third of an inch. It feeds on the under surface of leaves of *Amphicarpaea monoica*, in a slight web by which the leaf is a little curved downward, and in this web it passes the pupa state concealed in a rather dense, flattened, lozenge-shaped cocoon. The larva is very common in Kentucky in June and July, and I have also found it in September. I have never met with the imago except when I have bred it, and my specimens emerged from their cocoons in the latter part of July.

TINEINA.

STROBISIA.

S. albiciliella, n. sp.

I describe this species from a single specimen presented to me by Mr. Chas. Dury, of Cincinnati. Tongue, palpi and face white. Antennæ and vertex brown, with a bronze lustre and paler than the thorax and fore wings, which are shining blackish brown, with greenish, violet reflections;

apical ciliæ of fore wings white. Thorax above and the anal tuft bronzy brown, with a deep purplish lustre; under surface white. Legs white tinged with fuscous on their anterior surfaces, especially so at the apex of the tibiæ and on the tarsi. On the fore wings behind the middle are a very few white scales, forming an indistinct, short, transverse, white line. *Al. ex.* 5 lines. Taken at the light at Cincinnati, Ohio.

This and the three species described by Dr. Clemens are closely allied structurally and in ornamentation, and yet it is difficult to separate them structurally from the heterogenous assemblage of insects known as *Gelechia*.

ON A NEW ARCTIAN FROM FLORIDA.

BY A. R. GROTE, BUFFALO, N. Y.

The student is referred to my papers on the Bombycidae of Cuba for remarks on a generic group closely allied to *Halisidota* (*Halesidota*) which I have called *Euhalisidota*, describing under it the species *luxa*, *fasciata*, *scripta* and *alternata*. Closely allied to the first of these is a species from Florida, the male of which I have from Mr. Schwarz, the female from Mr. Dury. It is hardly so large, and without the black thoracic marks, although I can make out two black points on the collar in one specimen. It seems to differ by the streak of dusky speckles about the median vein at the extremity of the cell, and the distinct subterminal series of isolated black dots. The color is dusky ochre, with the thorax darker and the inside of the fore tibiæ orange. The male antennæ are bipectinate. The secondaries are paler, with a slight apical mark in the male.

It must be remembered that my type from Cuba was a little rubbed. In comparing my figure and the present female specimen I think there is a great probability of the species being the same. The object of the present notice is to record the occurrence of the group in the United States, and to show that the West Indian fauna must be well understood before we describe, as new, species from the extremity of the Floridian peninsula.

Mr. Schwarz captured the male *Euhalisidota* at Enterprise, May 26, together with several other interesting moths, some of which I have already mentioned in this journal, and others I hope to be able to publish on a future occasion.

BOOK NOTICES.

Lepidoptera Rhopaloceres and Heteroceres, by H. Strecker.

Part 14 of Mr. Strecker's work reached us by mail on the 28th of March, and on enquiry, we find that other subscribers received it within a day or two of that date. We desire to call particular attention to this fact, as this part of the work, in which a number of species are described as new, bears the date of 1877. In Dr. Hayden's last report Mr. S. H. Scudder describes a *Satyrus* larger than *Ridingsii*, and like it, from Utah, as *dionysius*, which seems to be identical with Mr. Strecker's *ashtaroth*. Mr. Strecker's *M. imitata* is also doubtless a synonym of *ulrica* Edwards, C. E., v. 9, p. 189, his *M. larunda* the same as *dymas* Edwards, C. E., v. 9, p. 190, his *Pamphila similis* Edwards' *Amblyscirtes nysa*, C. E., v. 9, p. 191, and his *Charis Guadeloupe* identical with *C. australis* Edwards, *Field and Forest*, Nov., 1877.

It is somewhat singular that Mr. Strecker, who in his work so often expresses his abhorrence of the practice of creating synonyms, and who has not hesitated to heap abuse on the heads of those whom he considers to have fallen into such errors, that he should himself so grievously err in this respect. The dating of a work of this sort 1877, which does not appear until March, 1878, can scarcely be called honest, especially if it be done with the view of establishing a claim for priority in the descriptions of species. We would also here take the opportunity of expressing our regret that Mr. Strecker's work, which in some respects has much to commend it, should be marred by such gross personal abuse as he so frequently indulges in. Such low and ungentlemanly language is entirely unworthy of any one aspiring to the humblest position in the scientific world, and can only result in injury to himself.

ENTOMOLOGICAL COLLECTING TOUR.—Mr. Wm. Couper, of Montreal, purposes visiting again the Lower St. Lawrence on a collecting tour this summer. He leaves on the 10th of May, and expects to return about the end of July. Parties wishing to correspond with him while absent will address their letters to Godbout River, Province Quebec, *via* Rimouski. This will be Mr. Couper's fourth collecting tour along the coast and among the islands of the St. Lawrence.

CORRESPONDENCE.

ONE WORD MORE ON *L. PSEUDARGIOLUS*.

DEAR SIR,—

It occurred to me to examine the genital organs of a black *violacea*, one day last week, and to my surprise, the individual was a male. Since then I have taken eight other blacks, and all are males. As it has been taken for granted that the black examples of *Lycaena* were in all cases female (at any rate where there is a blue male) I thought it best to send one of these so taken by me to Dr. Hagen for examination. And he replies :— "This morning I have carefully examined the abdomen of *L. violacea*. It is without any doubt a male. The organs are so fairly protruded that no section is needed." Now I have doubts whether there is any black female to this species. In a paper on Sexual Dimorphism in Butterflies, 1877, Mr. Scudder states that "wherever partial dimorphism is confined to one sex, it is always to the female ; there, seems to be no exception to the rule."

I have thought it possible that the female of *violacea* deposited its eggs on Dogwood flowers, as there seemed to be no other flower in bloom here at this season long enough to allow the maturing of the larvae, which, so far as is known, live wholly on flowers, and three days ago I tied a female in a gauze bag over the end of a branch of Dogwood, enclosing three of the flower heads. Next day I found about forty eggs had been laid, some on each of the flower heads, and among the flowerets, which are still in bud only, and search among the Dogwoods subsequently made led to the discovery of several eggs. We therefore have the food plants of the three broods, *Cornus* in spring, *Cimicifuga* in June and *Actinomeris* in fall.

W. H. EDWARDS.

Coalburgh, W. Va., April 16th, 1878.

ERRATA.—In the description of *Tricholita fistula*, published in the March number, read : Orbicular spot concolorous, oval, black margined reniform pipe-shaped, bowl turned to the base of the wing, white, broken —LEON F. HARVEY, Buffalo, N. Y.

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TORTRICIDÆ.

BY PROF. C. H. FERNALD, STATE COLLEGE, ORONO, ME.

The present is the first of a series of papers on the *Tortricidæ* of North America which the writer hopes to be able to prepare from the material now in hand, and collections that may be made hereafter by Entomologists in various parts of the country.

I was first led to the study of the *Tortricidæ* by the advice of Mr. A. R. Grote, who, with a generosity rarely met, placed his entire collection of Tortricids in my hands to work up, and further gave me his collection of European *Tortricidæ* for comparison, and loaned me his types for study. I fear I may never be able to make anything like an adequate return to this gentleman who has placed me under so great obligations.

I am very deeply indebted to Mr. E. T. Cresson, of Philadelphia, who gave me every facility for a careful and critical study of the types of Clemens, and also those of Robinson. I think it would have been impossible to have recognized some of Clemens' species without having seen his types. Some of his descriptions were made from very much damaged and mutilated specimens, others from single specimens which prove to belong to very variable species, and his descriptions in some instances are insufficient. Dr. Clemens' great mistake was in attempting to make descriptions from imperfect and insufficient material. His genera have also proved a stumbling block to those who have attempted to make out his species. Notwithstanding, this pioneer student of the North American *Tortricidæ* did an admirable work, and his papers will remain a monument to his zeal in the study of Entomology.

It is useless to deplore that he did not have access to the works of the continental authors; had he lived to revise his work, no doubt it would

have been far more satisfactory ; or had he lived and done his work in our time, and with the facilities now afforded, no doubt it would have been very different from what it now is.

I refrain from expressing any opinion on the work of Walker upon the North American Tortricids till I have an opportunity to examine his types in the British Museum.

Robinson's paper is a valuable contribution, and his excellent plates and descriptions leave but little to desire so far as he carried his work. It may be necessary, in the light of more recent knowledge, to re-place some of his species.

The next most important and pains-taking paper on the North American *Tortricidæ* is that of Prof. P. C. Zeller. I take pleasure in acknowledging the great obligations I am under to this veteran Entomologist for good advice, suggestions and valuable assistance in my work. Prof. Zeller has without doubt added considerably to the synonymy of our Tortricids, but as I have already shown, it was not possible to prevent it without access to the types.

I would also acknowledge the many favors I have received at the hands of Dr. Hagen, of Cambridge, who gave me an opportunity to examine the types of Prof. Zeller, and has aided me in other ways in my work.

Some time since I saw a request that workers on special groups would give directions for collecting and preserving the insects they are working on, and it may be well for me to act upon that suggestion, since very few collections sent to me are in as good condition as I could desire. Without doubt, the most perfect specimens can be obtained by breeding, and I should be very glad if collectors throughout the country would breed and send to me as many as possible, not only of different species, but different individuals of each species, together with notes on their early stages.

For some time I collected Micros in a cyanide bottle, and they became so denuded by rolling over in the bottle that even with the best of care they were nearly worthless. I have since adopted the plan of carrying a supply of pill boxes, into which I put the Tortricids alive. The advantage of this is that they cling to the inside of the box and are not injured by rolling over. One roll over the bottom of a box or bottle is sufficient to remove the thoracic tufts or other characters of great importance.

When one is ready to pin and spread them, they can then be put into the cyanide bottle, or killed with chloroform, pinned and spread at once. I cannot urge too strongly that *Tortricids should not be touched with the thumb and finger*, but should be handled with a pair of fine forceps, laid upon a piece of pith held between the thumb and finger, and the pin inserted and passed down through the middle of the thorax so as not to injure in any manner the thoracic tuft.

For the larger and medium-sized Tortricids I prefer japanned pins, leaving one-fourth the length of the pin above the insect in case the long or German pin is used. For the smaller ones silver wire may be used, which, with the insect upon it, should be inserted in one end of a neatly cut, brick-shaped piece of fungus, through the other end of which a pin of any desirable size may be passed, and the specimen put in its place in the cabinet. By far the best, and the only fungus known to me, suitable for this purpose, is the *Polyporus betulinus* Fr., which grows in abundance upon decaying white birch. This fungus should be thoroughly dried, after which it may be cut with a razor into pieces of any desired form. A collection of Micros mounted upon neatly cut pieces of this clear, milk-white fungus, shows to very good advantage.

Another kind of pin which is very good for Micros is one of German manufacture, of silver, for sale by B. P. Mann. The great objection to this pin is its high price. A desideratum seems to be a fine silver pin as short or shorter than the English pins, of suitable size for the smaller Tortricids, to be used with the fungus as described. I very much dislike the common insect pins for Tortricids, for they corrode so much, in many instances, as to nearly ruin the specimens.

Of course the collector should spread his captures as soon as their muscles are well relaxed, or else before they become rigid, if he has time, otherwise they may be put aside, softened up and spread at leisure. I would prefer to have all sent to me for determination spread, provided the collectors are skillful at this, but if not, they had better not attempt it lest they ruin the specimens.

Paedisca Worthingtoniana, n. s.

Palpi, head, thorax and fore wings lemon yellow, inclining to straw color in some specimens; outside of the middle joint of the palpi stained with brown; costal edge of the fold of the males and a spot over the

middle of the cross-vein in the fore wings of both sexes dark brown ; fringe tinged with fuscous. Hind wings fuscous, darker apically ; fringe lighter. Under side of fore wings dark brown, with violet reflections in some specimens. Under side of hind wings much lighter than above. Fore and middle legs fuscous, hind legs lighter. Expanse of ♂, 35 to 39 m. m. ; ♀, 43 m. m.

Described from two male and four female specimens, collected by C. E. Worthington in "North Illinois, at dusk about wild phlox on the prairie, flying like *Plusias*." I also received from Mr. Worthington three females taken at the same time and place, which have the fore wings, especially between the veins, of a light brown color, the discal spot showing plainly through the general color of the wing. I regard this as simply a brown variety of the above.

NOTES ON LARVÆ, ETC.

BY C. G. SIEWERS, NEWPORT, KY.

Last summer, near the end of July, in skirmishing through a wood overgrown with White Snake-root weeds, I struck a large find of the *Callimorpha interrupto-marginata* moths, and collected some 50 specimens. Others collected as many more. The weeds were covered with their larvæ, of a bright yellow color, with a white lateral stripe, mottled along its upper edge with bright red, the anal end being also faced with red markings. The length about $1\frac{1}{2}$ inches. I collected altogether some 200 of them, but utterly failed to bring one to pupa. As they stopped feeding they were taken with a white scouring, leaving nothing but empty skins. Others tried them with like result. The bushes were also strung with their dead bodies. Still some must have escaped, as the brood this year was just as large. But the larvæ failed again to pupate. I think the fault is in the food plant, as cattle will not touch it, and such as are knocked off may take to other food and escape. Cannot some of your correspondents explain this ?

About the same time last year I found a remarkably handsome green larva on our Western Coffee-nut tree (*Gymnocladus canadensis*). Length

over two inches ; lateral red and white stripes similar to *Saturnia io*, with an anal red horn and two pairs of similar horns on each of the 2nd and 3rd thoracic segments, with short red spines along the dorsal line. In appearance much like *Citheronia regalis*, though but one-third its size, of a hard stony make, evidently an *Anisota*. The pupa has the long spur and indented segments common to the species. I collected quite a number. They are two-brooded, and may be three, as I found them of all sizes at the same time. Female moth measures $2\frac{1}{2}$ inches between the tips of wings, the male 2 inches. Primaries light brown in the females, with and without the central discal brown blotch ; the male with darker primaries, with the outer third slightly roseate, and with two white discal superposed spots duskily fringed. Hind wings rose color on both sexes, darkest near the body. The wings of both mottled with brown on the primaries. Should like to have it named.

I had so much trouble with ground for larvæ last year that I concluded to try sand, and got a lot of fine yellow sand similar to that used by moulders, moistened it thoroughly two months since, and it is as moist and loose as ever, and if I may speak for the larvæ that have tried it, they are just delighted with it and plunge right in.

I find empty butter tubs very convenient, having wooden caps and not warping like boxes, but it is necessary to scald them out thoroughly and then lime the sides. Failing to do this last summer, I found some *E. imperialis* larvæ covered with small house ants that had eaten the epidermis full of holes nearly through ; they, however, all got over it, though covered with black spots.

ON THE NATURAL HISTORY OF GALL INSECTS.

BY DR. H. HAGEN, CAMBRIDGE, MASS.

The natural history of the interesting gall insects is still somewhat mysterious. A large number of observations have been made here and in Europe by prominent Entomologists ; nevertheless, a careful study

of the most detailed papers always gives the impression that something is still wanting to explain the various facts related by the authors. Among the Hymenopterous gall insects important progress was made in the discovery by the late B. Walsh of the dimorphism of *C. q. spongifica* and *C. q. aciculata*, the latter one a parthenogenetic species. But even here new observations are wanted to fill some gaps in the history of those species. Mr. W. F. Bassett, of Waterbury, Conn., draws my attention to the fact that in a letter in the Proc. Entom. Soc. Lond., April, 1873, p. xv., he "did state most emphatically his belief that all one-gendered gall flies were the alternate of a two-gendered brood from galls of a different form."

Two papers by Dr. Adler, from Schleswig—"Contributions to the Natural History of the Cynipidæ," and "On the Ovipositor and on Oviposition of Cynipidæ," in Berlin, Entom. Zeitschr., vol. xxi., 1877, Decbr., which have just arrived here, are prominently remarkable. I believe the way so long sought for is found, to understand the complicated relations not only of the Hymenopterous gall insects, but probably of all other gall insects, and perhaps, also, of some other insects not gall-producing. These papers are equally remarkable both by the manner of the experiments, the judicious conclusions drawn from them, and the clear and plain description of what he has observed. Dr. Adler has raised the species through several years. In Cynipidæ the raising is less difficult, as the eggs are, mature the moment the insect has passed its last transformation; the females are usually disposed to lay the eggs directly, and are, at least many of them, not disturbed by observation; therefore the experiments with them followed through several years become more reliable.

The parthenogenesis of *Rhodites rosae* was proved by direct raising through three years. The fact is, indeed, more remarkable as males exist in a very small number, about one to a hundred females; but a copulation was never observed. The females carefully separated after their transformation, laid the eggs in confinement. Moreover, a number of females were dissected and showed always the receptaculum seminis empty, therefore proving that the eggs were not impregnated.

Other series of observations lead to the interesting discovery of alternating generation by a number of species, which were considered to belong to different genera, but are now proved to be the winter form and the summer form of the same insect.

Neuroterus fumipennis was raised from the galls, the imagines placed

on oak buds, the oviposition observed, and the plants isolated. The galls originating from them were entirely different from those galls out of which *N. fumipennis* was raised. By further growth they proved to be the well known galls of *Spathogaster albipes*, which species was raised from them in due time. These two Cynips belong to two different genera, and differ in size; *Neuroterus*, the winter form, is agamous, only females known, and the receptaculum seminis was always empty; the eggs are laid deep in the buds. *Spathogaster*, the summer form, is bisexual, males and females in regular proportion and copulating; the receptaculum seminis of the egg-laying females being always filled with spermatozoa. The eggs are laid on the leaves. To complete the cycles, *Spathogaster* galls carefully confined were raised and gave in due time *Neuroterus*. The experiment was made repeatedly on a large scale and with excellent precautions, so that no doubt is possible. Now as the fact is known, it is rather remarkable that it was not sooner discovered, as it is entirely impossible for *Spathogaster* and for *Neuroterus* to produce the galls out of which they are always raised. *Spathogaster* possesses a short and somewhat degraded ovipositor, just fit to injure the superficies of a leaf and to lay the egg; *Neuroterus* possesses a long, bent and complicated ovipositor, able to perform the rather difficult act of entering the bud and laying the eggs in the basis of the bud, but would be scarcely able to injure the superficies of a leaf in the same manner as *Spathogaster*. I think this admirable discovery is of the greatest importance for further observations. If we find again a species with an ovipositor not fit to make the galls of the species, we are justified in presuming a similar alternating generation with some other species.

The difficult question how the eggs of Cynips are able to pass through the comparatively small ovipositor is described with much detail and acumen. The observation was only possible by the ingenious device of chloroforming the insects in the act of oviposition, and making an anatomical investigation of the parts. By repeating the observation many times in different stages of the act, a full series of observations, one completing the other, gave a clear and satisfactory result, and at the same time the place was ascertained in which the egg was laid. A large number of other interesting details concerning the formation, structure and the growth of the galls, are given, which must be studied in the original paper. I may only add the surprising fact of the continuous rotation of the embryo in the egg, till it is hatched. The rotation is not

made as in mollusks, by vibrating cells, but by the alternate contraction of long spindle-shaped cells, which are attached to the hypodermis.

Similar experiments with similar results followed also through the whole cycles, proved that *Neuroterus lenticularis* is the winter form of *Spathegaster baccharum*, and *N. numismatis* the winter form of *Sp. vesicatrix*. Dr. Adler adds that experiments with all three species are not very difficult, and he believes that every student will be able to repeat them.

It seemed to the author more than probable that such alternating generation would not exist alone in *Neuroterus*. Similar observations and experiments followed through all the cycles proved that *Dryophanta scutellaris* is the winter form of *Trigonaspis crustalis*, and *Dryophanta longiventris* the winter form of *Spathegaster Taschenbergi*, but for the last species only half the cycles was till now ascertained.

Direct observations proved that the egg of *Dryophanta* is laid with the egg-body downwards and the stem of the egg upwards. The situation is just reversed in *Neuroterus*, and as the egg is always hatched through the hind portion, the larva of *Dryophanta* is obliged to make its galls downwards in the cambium, and the larva of *Neuroterus* upwards on the leaves.

Another agamous genus, *Aphilothrix*, possesses an ovipositor similar to *Neuroterus*, and it seemed impossible that the large galls out of which it develops could be made by such an ovipositor. Similar observations gave the result that *Aphilothrix radialis* is the alternating generation of *Andricus noduli*, and *Aphilothrix Sieboldi* of *Andricus testaceipes*. Neither *Aphilothrix* nor *Andricus* develop in the same year; each of those genera needs two years for its development; therefore the whole cycle runs here through four years, and till now only half the cycle of *Andricus* bred from *Aphilothrix* galls has been ascertained by observation.

I think there can be no doubt that the agamous *C. q. aciculata* is the winter form of the bisexual *C. q. spongifica*, just as *Neuroterus* and *Dryophanta*; but here both species have the same kind of gall, and both species are less different than those above quoted.

The remarkable success of Dr. Adler's experiments with the Hymenopterous galls induced me to compare the rather large collection of Dip-terous galls from Europe and America belonging to the Museum. I found directly some forms entirely similar and corresponding to the alternating galls of Cynips; but the collection is rather poor in bred specimens of the

insects. Just in the presence of the judicious and sober observations of Dr. Adler, it would not be proper to say more than that it is not difficult to point out galls of *Cecidomyia* similar to both forms of the alternating *Cynips* galls. It is to be presumed that in *Cecidomyia*, as well as in *Cynips*, the form of the ovipositor will be different, but such investigations can scarcely be successful with dry specimens.

I may add one observation made by myself, by which it is at least probable that bisexual species of *Cecidomyia* may also propagate by parthenogenesis. Some twenty years ago, occupied with the study of insects obnoxious to agriculture in Prussia, I had stalks with cocoons of *Cecidomyia destructor* in corked glass tubes. In one of them I raised a single female, and was sure that no other cocoon was present. The female laid a number of eggs on the glass, which after a few days began to develop so far that the embryo and the segmentations of it were clearly visible. By some mischance the glass tube was left in sunlight and the development stopped. Though I have not been able since to repeat the observation, I am sure that I was not mistaken. I think it is justifiable to presume a possible parthenogenesis for *Cecidomyia*, which, if proved, may lead to successful results concerning the destruction of this dangerous pest.

After having studied Dr. Adler's papers, I remembered directly some similar facts given by Mr. Lichtenstein in Stettin. Entom. Zeit, 1877, on the Hemipterous genus *Phylloxera*; the alternation is here very remarkable. The bisexual form originates from pupæ, which are produced by larger winged forms, which possess no external sexual organs and can therefore not copulate. Mr. Lichtenstein calls this form of propagation anthogenesis. A certain similarity with *Cynips* consists in the fact that the different forms of *Phylloxera* emigrate in spring and return in the fall. So the well known *Ph. vastatrix* emigrates from the leaves to the root of the same plant, and needs therefore no special winged forms for the purpose of emigration. But *Ph. quercus* changes to another tree, and needs therefore two winged forms, which are different one from the other. One parthenogenetic form brings the summer colonies from *Ilex* to *Robur*, and another anthogenetic fall form brings them back from *Robur* to *Ilex*. The fact that some species possess two different winged forms will probably reduce the number of the described winged species. Till now it is only known that *Ph. Lichtensteini* is the anthogenetic form of *Ph. quercus*, and *Ph. Signoreti* probably the same form of *Ph. florentina*. Mr. Lichtenstein presumes that many *Pemphigus* and *Adelges* will possess similar

forms, and observations made by myself on one species in the last year seem to favor his opinion.

Such alternations stated without doubt for Hymenoptera and some Hemiptera, and probable by analogy for some Diptera, will certainly not fail to occur in other orders, and are probable in some Lepidoptera heterocera.

A paper by Mr. P. Cameron, in the *Scottish Naturalist* for April, 1878, the substance of which is incorporated and fully approved in the President's Address to the Entomological Society of London, arrives at conclusions entirely unfavorable to Dr. Adler's memoir. To corroborate my views about the memoir I wish to give a few statements.

Dr. Adler gives the facts upon the discovery "of the Parthenogenesis of *Rhodites rosae*" on ten pages, about two-thirds of the first part of his memoir.

In May, 1872, *Rh. rosae* in large numbers was observed; some few males appeared, which were put, together with several females, in the breeding cabinet; but no copulation was observed. For further experiment were chosen females appearing later, of which, by careful observation, it was certain that none of them had been with any male. Those females were put on bushes of *Rosa canina* on May 10th—12 wasps, May 13th—16 wasps, May 26th—10 wasps, June 2nd—6 wasps; together, 44 wasps. Of those 26 wasps were observed in the act of oviposition, and the twigs were marked with a thread around each. The first formation of a gall was observed June 5th, and in all only nine twigs formed galls; giving the positive result that unimpregnated eggs had developed. The experiment was tried again for the purpose of having surer results by repetition and to investigate why the first experiment was without result in so many cases. In 1874 there were put, June 22nd, on rose bushes 8 wasps, 4 of which were observed in oviposition, none producing galls; June 23rd, of 10 wasps, 4 observed in oviposition, 2 producing galls; June 27th, of 12 wasps, 5 were observed in oviposition, producing 3 galls.

Of the 13 wasps observed in the act of oviposition, 4 were dissected, and the receptaculum seminis stated to be entirely empty (without spermatozoa). Every one of the wasps spoken of was carefully observed and not lost sight of till the wasp had begun the oviposition, in which act some persevered for more than 24 hours. Of course observation was not followed through this whole time, but every few hours it was again observed

that the wasp was continuing the oviposition. The five produced galls were in November preserved for the experiment of the following year. In the spring of 1875 there were raised from them 35 wasps, all females, and a large number of parasites. These wasps were put again on rose bushes as soon as they appeared on May 26th, June 2nd, 5th, 7th, and oviposition observed on 11 twigs. After 11 days some of the eggs were examined, and the embryo found in different stages of development (more details are given). Of the 11 twigs 6 produced galls, out of which were raised in spring, 1876, 28 wasps, all females. Those wasps were put on rose bushes June 26th, July 2nd, July 4th, and oviposition observed on 13 twigs, which produced 8 galls. Therefore, through three years parthenogenetic-propagation was observed. The objection that in experiments thus made in the open air oviposition could have been made on the same twigs by other wasps, can not be refuted directly; but if it has been noticed so many times that only galls were produced in the observed and marked places, I believe it is allowable to conclude that none except the observed oviposition had been made.

The other question, if the unimpregnated eggs are regularly developed, was answered in the affirmative by repeated experiments, which are very simple and very easy to be repeated. I put female wasps, raised by myself, which had not been with a male, on shoots of rose put in a jar in water. As soon as the wasps began oviposition, the shoot was placed in a breeding cabinet. After oviposition had ended, the wasp was examined anatomically, and the vesicula seminalis found to be empty. The eggs were examined after 12 hours, and the peripheral layer of cells around the dark yolk was seen; in the following days the development advanced in the regular manner.

Dr. Adler gives on five pages more the most interesting details upon the formation and growth of the gall. As *Rh. rosae* is common here, this part of the memoir is of great value for American students. If we look in Mr. P. Cameron's paper, we find about this matter on p. 156, as follows:

"With the bisexual Cynipidæ the males are in some species nearly as common as the other sex; in others, as in *Rhodites*, they are very rare." That is all!

On the alternation of generations in Cynipidæ the first part of Dr. Adler's memoir contains only (6 pg.) the beginning of the experiments

with *Neuroterus fumipennis*. The second part (24 pg.) was published three months later than Mr. Cameron's paper, which contains, nevertheless, some of the names of the species (5 out of 7) treated in the second part, probably out of a provisionally published notice, unknown to me.

Dr. Adler having raised in 1874 out of all *Neuroterus fumipennis* galls nothing but *Spathogaster albipes*, decided to observe them more exactly. The experiments with *Neuroterus fumipennis* were made in 1875 in the following manner :

The galls were collected in the autumn before. When the wasps began to appear, they were put on a small oak tree in a tub in a cool room. When a wasp began oviposition each twig was enclosed in a glass tube, after the bud had been marked with a thread. There were marked March 14th—12 buds, March 19th—10 buds, March 24th—8 buds, March 26th—6 buds ; in all, 36 buds. Besides those, other wasps were put on cut oak twigs placed in damp earth or sand (in which manner the twigs keep well three weeks and longer as good material for observing the eggs), and after oviposition was observed, the isolated twig was covered with a glass bell. The wasps were examined after the oviposition and the receptaculum seminis found to be empty. The receptaculum is in the agamous species always somewhat atrophied ; in the bisexual species the external membrane is pigmented, and even if empty, forms a ball.

Besides those experiments, others were made at the same time in the open air. The oviposition was observed March 31st on 5 buds, April 1st on 7 buds, April 2nd on 12 buds, April 7th on 12 buds, April 10th on 40 buds, April 12th on 38 buds ; altogether on 114 buds. A curious fact is related that in 42 buds the ovipositor of the wasp was found left in the bud.

The results of the different experiments were as follows : The small oak tree in the tub was kept in the room and began to bud in the beginning of May, and the leaves were developed enough May 14th to see if galls were forming. Of the 36 marked buds, 13 had no galls produced ; on the others in all 36 galls were counted. It is to be remembered that here oviposition was made and observed in the room, the twigs carefully isolated by glass tubes, and kept in the room till the tree began to bud. Therefore it is impossible that eggs could have been laid by other wasps. The galls were those of *Spath. albipes*. Concerning the experiments in the open air, the leaves of the tree were May 20th so far

developed that the formation of galls could be observed, and again the galls were those of *Spath. albipes*. Out of the 144 buds marked, galls were found on 68, with about 300 galls. The oak chosen was a small shrub four to five feet high, easy to be examined, and showed no where any other galls.

Out of the collected galls a large number of *Spath. albipes* was raised in the first half of June, and were put in a breeding cabinet with a small oak tree. As no copulation nor oviposition was observed, Dr. Adler decided to try observation in the open air. He succeeded June 3rd in finding several females of *Spath. albipes* in the act of oviposition, and secured six wasps, several leaves, and marked four leaves on which he had observed oviposition with a thread. The lens showed that an egg was deposited. The secured wasps were put on the small oak in the breeding cabinet, and now the wasps were observed ovipositing on two leaves. The next day the wasps were examined, and showed the receptaculum seminis full of spermatozoa. On June 5th and 6th several more wasps in the act of oviposition were observed, and six leaves marked. In the first fortnight no change in the leaves was seen; in the third week the substance of the leaf where the egg was deposited was visibly thickened, the larva had left the egg, and the formation of the gall began. Then the progress was very slow; after four to five weeks, in the beginning of July only a very small hairy disk was seen, and only in the end of July the galls could be recognized with certainty as those of *Neuroterus fumipennis*. On all ten leaves such galls were produced.

I have given here the substance of Dr. Adler's experiments only for one pair of individuals, but in the same manner the memoir contains them for seven pairs; two of these, *Neuroterus lacviusculus* and *Spath. tricolor*, *Aphilotrix Sieboldii* and *Andricus testaceipes*, are not mentioned by Mr. P. Cameron.

I think every student will be puzzled to find such detailed observations unmentioned in Mr. Cameron's paper, when he asks if a consideration of the biology of the species named affords *any reasonable evidence in favor of this rather startling hypothesis* (p. 154). The only evidence Mr. Cameron tries to give against it is that, if the species are correlated in the way indicated, we ought to find the two forms equally abundant, and in close proximity to each other. He states that only one of the five pairs quoted by him are found together, the other four are not. This fact, *if true*, would be certainly of importance; nevertheless, I

should have preferred in the face of apparently so carefully made experiments to examine first, if one of the two authors, either Dr. Adler or Mr. Cameron had not determined wrongly one species of the pairs. But a stronger objection against Mr. Cameron's assertion is that I possess two of the four doubted pairs from the same locality. The May number of the Ent. Month. Mag., just arrived, has on its first page a notice by Mr. J. E. Fletcher, stating that galls made by *Neuroterus numismatis* proved to be those of *Spathegaster vesicatrix*. This is the third of the four pairs doubted by Mr. Cameron. After all I may quote against such kind of evidence the following remarks of the late Mr. B. D. Walsh in his *Cynips* paper (p. 11):

"I once argued in print that it was impossible that the army worm moth should exist in the Eastern States, for if it did it must have been found there either by Dr. Harris or by Dr. Fitch, and that scarcely had the argument been printed, when it was proved by indubitable evidence that it did exist."

Mr. P. Cameron's objections against the fifth pair, *Aph. radialis* and *Andricus noduli* show simply that the German text was not understood.

Now where are the direct and well continued observations of facts to blow to the winds this theory? I may add that the unprecedented observation that he put some specimens of *Aphilotrix radialis* in spirits for a week (!) and that they revived, when taken out, would be rather difficult to be repeated.

If such facts, as given by Dr. Adler, are not to be accepted as true, I think they can not be called "hypothesis or theory," but simply a fiction, or in plain English, a forgery—which nobody able to understand the German text will accept.

ON EUPROSERPINUS PHAETON.

BY A. R. GROTE,

Director of the Museum, Buffalo Society Natural Sciences.

The fact that Mr. Strecker has seen fit to misstate the circumstances under which this species was named has induced me to correct the impression he may have created as far as possible.

In our Synonymical Catalogue (1865) the species is entered as follows :

Euproserpinus Grote & Robinson.

16. phaeton.

Proserpinus Phaeton Boisduval MSS.

Euproserpinus Phaeton Grote & Robinson (1865).

Habitat—Western District !

In the descriptonal part (p. 30) we say : "We are indebted to Mr. J. W. Weidemeyer for the information respecting this singular little species, which, we believe, has not been hitherto described, while an excellent figure, shown us by Mr. S. Calverley, enables us to present the present description and to fix the species. It appears that Dr. Boisduval has etiquetted a specimen in his cabinet as *Proserpinus Phaeton*."

So that both in the Catalogue itself and in the description we give Dr. Boisduval credit for the name *Proserpinus Phaeton*. What more it was possible for us to do I cannot see. There is not the faintest desire on our part to avoid giving the fullest credit to all parties known to us to have anything to do with the species. Mr. Calverley's figure came probably from Dr. Behr or Mr. Hy. Edwards with the name *Phaeton*. This figure was engraved for a hitherto unfinished work on the Sphingidæ. Of this work I have an incomplete copy; the last plate is numbered xxvi. The plates are headed : "North American Lepidoptera." The first two plates have in the lower left-hand corner : "Published by J. W. Weidemeyer and S. Calverley, New York." Plate iii. *et seq.* have the name of Mr. W. H. Edwards added. I believe the plates were lithographed and colored by Chas. Walo between 1863 and 1868; possibly these dates are not strictly accurate. To the last plates I contributed originals. Two of the plates (Nos. 18 and 19) were executed in England; W. West, imp.; E. W. Robinson, delt. On plate 19, fig. 1, is a figure of *Lapara* (not *Lipara*) *bombycoides* Walk., which I have long ago shown the reasons for believing to be *Ellema harrisii* or a closely allied species. On plate 13, fig. 5, "*Proserpinus Phaeton*" is figured. In 1868, three years afterwards, we redescribed this species from a specimen loaned us by Dr. Boisduval. The specimen was not labeled to my recollection, and as we were under the impression that Dr. Boisduval knew our Synonymical Catalogue, there could be no question as to the name. We were much puzzled afterwards by Dr. Boisduval disowning the name *phaeton*, describ-

ing the insect as *erato*, and overlooking our Synonymical Catalogue. In his larger work on the Sphingidæ Dr. Boisduval adopts our name for the insect and again overlooks the fact that we had described the species nearly *three years* previous to our acquaintance with himself (though he quotes our work), and supposes that we have chosen a fresh name for the species, when we had never heard of the name *erato* until Dr. Boisduval published it, and, moreover, we had credited the name *phaeton* to him in 1865! How the misunderstanding came about it is now difficult to say. Perhaps Mr. Weidemeyer or Dr. Behr can give the proper light as to where the name *phaeton* came from. I have previously suggested either that the name *phaeton* came from Lorquin or Dr. Behr, or that a transposition of names occurred between Dr. Boisduval and the Californian Entomologists. That Lorquin gave names to species which Dr. Boisduval adopted as his own in some cases is, I think, suggested in the case of the species of *Nemeophila* and others, where the insects are named after the food plants. It is evident that Walker has used Dr. Boisduval's MSS. names without credit. With regard to mistakes of names by transposition, the student need only be reminded of the error with regard to *Oeneis semidea* and an *Aegerian* (See Scudder, Proc. Ent. Soc. Phil., 1865, 13, and elsewhere). As to Dr. Boisduval's inattention to previously published papers Mr. A. G. Butler says this "author's worst fault is a too great appreciation of his own MS. names, for which he does not scruple to sacrifice both genera and species long described by other authors." I do not think, in conclusion, that there can be the slightest ground for the suspicion that we intended any wrong in the matter of the name of this species, since we gave Dr. Boisduval full credit for the manuscript name *phaeton*, giving him precedence in the synonymy, a fact which it suits Mr. Strecker to omit. There remains also no doubt that the correct name of the species is *phaeton*, since our original description is perfectly recognizable and since Dr. Boisduval himself adopts this name in his important work on the Sphingidæ in preference to his own later name of *erato*, giving us credit for the species. I do not think that it will be possible to consider the species either a *Macroglossa* or a *Proserpinus*, and that the generic name *Euproserpinus* must stand.

I feel also at liberty to state, what many of Mr. Strecker's readers may have suspected, that there is a very different reason for his personal attacks upon me than that they are called for by my publications. But I am quite confident that in all my writings I have endeavored to give full

credit to every other writer ; where I have failed it has been through unacquaintance with the work of others. And I very much regret that there is an unavoidable jealousy which remains strongest with those whose mental resources are narrowed down to the field of descriptive Entomology. In conclusion, I think I can be spared a lengthy exposition of Mr. Strecker's breaches of the ninth and tenth commandments, and leave the matter to those interested in a subject which has nothing to do with the advancement of science, but rather offensively illustrates the principle of self-preservation.

ENTOMOLOGICAL APPOINTMENT.—We learn with pleasure that Prof. C. V. Riley has received the appointment of Entomologist in the Department of Agriculture at Washington, rendered vacant by the retirement of Prof. Townsend Glover, whose failing health necessitated this rest from active labor. While we sincerely regret the severe illness of our good friend, that laborious worker and painstaking Entomologist, Prof. Glover, we cannot help congratulating the Department in having secured the services of such a thorough and vigorous laborer in Entomological science as Prof. Riley is known to be. His long experience and natural fitness for the work in which he is now engaged will, we feel confident, make him a most efficient officer.

CORRESPONDENCE.

ON A COVERING SUPERIOR TO PAPER FOR CORK-LINED BOXES FOR THE CABINET.

DEAR SIR,—

Four years ago I first used a white wash for covering the cork in my cabinet, and I have found it so much superior to paper that I feel induced to recommend it very highly to all Entomologists.

It is cheap and easily applied. I take French zinc (dry) and after adding a little blueing, I mix with it as much milk as will make it about

the consistence of thick cream. With this I give the first coat to the cork, rubbing the stuff with my hand well into the little holes of the cork until these are all closed up. As soon as dry I give it another coat, using the white wash somewhat thinner, and apply with a brush.

Since using it I have never found a single specimen of the tiny paper louse in my cabinet, while prior thereto these pests gave me a good deal of trouble. *Anthrenæ* also give me hardly any trouble, as their places of retreat, the cracks and worm holes in the cork, are entirely covered up with the zinc.

If applied carefully it will have just as even an appearance as paper, and the white will keep fresher and cleaner than paper. Give it a trial.

EDW. L. GRAEF, Brooklyn, N. Y.

ERRATUM, ETC.

DEAR SIR,—

P. 59, vol. 10, line 17, for *Euprepia judica* read *Euprepia pudica*.

During the latter days of March I saw *Pieris rapæ* in considerable numbers at Asheville, N. C. ; and on April 2nd I saw many scores of *Æthilla bathyllus* S. & A., near the same place, the elevation of the spot being between 4,000 and 5,000 feet. These were playing around damp places by the road side. I was informed by the farmers that *Doryphora 10-lineata* had never yet appeared there.

W. V. ANDREWS, Brooklyn, N. Y.

DEAR SIR,—

A scientific friend who attended the last monthly meeting of the Entomological Society in Boston, wrote to me the next day of a very interesting communication made by Dr. Packard on the exodus of a luna moth. He "heard a rustling in the cocoon and a curious cutting sound, and saw two black points sticking out, which worked back and forth, cutting the silk until a slit was made large enough for the moth to crawl through. Then he discovered that the black points were *two spines* on the submedian nerve of the fore wings. As the wings expand these spines become covered with the wing scales and do not show." Dr. Packard said these spines exist in nearly all the Bombycidæ, but he did not find that this use of them had been mentioned in any of the treatises to which he had time to refer, it being supposed that moths work their way through the silk, first softening it by a liquid exuded from the mouth.

The information received I brought before the Montreal Branch of the Ontario Entomological Society, and it caused some surprise, as members had never heard of the process. During the evening the President, Mr. G. J. Bowles, exhibited a *Polyphemus* moth just out of chrysalis, which got away and flew into the gas, so burning itself that it had to be killed. The moth was examined, and close to the base of each fore wing a spine was found, quite long and sharp, which could certainly be used by the insect for scratching and tearing the silk of the cocoon so as to facilitate the egress of the moth. The inside of the cocoon at the opening seemed to bear marks of its work. This discovery has excited quite an interest among our members, and we await the opinion of other Entomologists on the subject.

JOHN G. JACK, Montreal.

DEAR SIR,—

During last summer we were visited by an insect which attacked our White Pine trees (*Pinus strobus*). I refer to Abbot's White Pine Worm, *Lophyrus Abbotii*, a gregarious worm of some note in the south and west. I have not seen it noticed by any of our Canadian Entomologists, and consequently do not know whether it is a common insect in this country or not; but I *do* know that should it become very numerous it would shortly be a very heavy blight on our White Pine, either in grove or forest growth. I have not yet seen any on the imported pines, such as the Scotch and Austrian; indeed the insect seems tenaciously to prefer our native species, probably because of its soft and tender foliage. It appeared here in July and August (I neglected to note the exact date), but in such flocks that they soon defoliated the branches on which they were working, and were thus easily detected. When nearly full grown these saw fly worms measure from three-fourths to one inch in length, are heavily marked by black spots on a dull whitish ground, and have the habit of bending the fore part of their bodies backwards on being approached or disturbed. According to Prof. Riley, the parent saw fly deposits her eggs on the slender leaves of the pine in autumn, where they remain in the egg state all winter, hatching early in summer. The remedies recommended for this pest are hand-picking, the use of dry air-slacked lime or powdered hellebore mixed with water and sprinkled on the affected parts.

B. GOTT, Arkona, Ont.

DEAR SIR,—

As correspondence is invited respecting the habits, localities, occurrence, etc., of insects, I take the liberty to offer a few remarks on the *Doryphora 10-lineata*, and also to send you a list of the Geometridæ that I have thus far taken in this locality.

Wishing to ascertain if the domestic fowl were likely to be of any value in reducing the numbers of *D. 10-lineata*, I procured the assistance of a neighbor who kept fowl (I do not keep them myself), and the following is the result of our experiments :

Our first experiment was to offer both larvæ and beetles to the fowl, but they refused to touch them, and acted as if somewhat afraid. Next we mixed the insects with the corn and other food that was given them, but they refused even to eat the corn for a time ; by-and-by, however, they began to eat the corn and soon lost all fear of the insects, although they still refused to eat any. After a few days, by keeping the insects in their food all the time, some of the bravest of the hens began to eat a few insects, and it was not long before the rest joined them, and in a few days more they appeared to relish the beetles about as well as the corn. Up to this time I did not observe any of the fowls eat a beetle from the potato vines, but they now began to do so, and we were obliged to put them in their food no longer. After this the beetles were so reduced in number in this garden that they did no material damage.

It would seem from the above that although the beetles were naturally repugnant to the domestic fowl, yet an appetite for them may be acquired. If the substance of the above has been published I was not aware of it, and give it for what it is worth.

I noticed in the last report of the Entomological Society of Ontario, in the experiments on the Colorado Potato Beetle, by W. Brodie, the remark that "it is very doubtful if *Doryphora*, either in the larva or imago state, will feed on *Solanum dulcamara* or *Datura stramonium*." I have found the insect in both these stages plentifully on *S. dulcamara*, which grows quite abundantly near this place, and they wholly consumed both leaves, flowers and fruit of every plant in this vicinity. They were more abundant on these plants than on my potato plants, which were not more than five rods from some of the former.

I took a few examples of *Brephos infans* Mos., March 23rd, which is some two weeks earlier than I ever made a capture of them before.

J. E. BATES, South Abington, Mass.

The Canadian Entomologist.

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THE ACHEMON SPHINX—*Philampelus achemon* Drury.

BY THE EDITOR.

The Achemon Sphinx is not common in Ontario; occasionally, but rarely, we have found the larva both on the Grape-vine and Virginia Creeper (*Ampelopsis quinquefolia*), and once or twice captured the perfect insect.



Fig. 4.

The moth (fig. 4) is a handsome one, and having the usual strong and rapid flight of the Sphinges, is not easily captured. It may be met with on the wing late in June, about dusk, hovering like a humming-bird over flowers and sipping their sweets through its long proboscis. Its color is brownish-gray, variegated with light brown, and with the dark spots

shown in the figure of a deep brown. The hind wings are pink with a dark shade across the middle, a few still darker spots below, and with the hind margin widely bordered with gray.

The caterpillar (fig. 5) is a formidable looking creature, measuring when full grown, if at rest, about three inches, but when in motion three



a.

Fig. 5.

and a half inches. They feed singly, and hence, when young, do not attract much notice, but as they mature they consume enormous quantities of food, so that a single specimen will in a short time render long branches of the vine entirely leafless. This larva varies much in color; when young it is usually green, with a long, slender, reddish horn rising from the last segment but one, and curving backward, but after each moult this horn gradually lessens in size until, as it approaches maturity, it disappears entirely, its place being occupied by a polished tubercle. When full grown the general color is sometimes green, but more frequently a pale straw or reddish-brown, deepening in color at the sides, and finally merging into a rich brown; there is also a broken line of brown along the back, and another unbroken, with its upper edge fading gradually along each side. It has six scalloped, cream-colored spots on each side, and the body is covered more or less with minute spots, which are dark on the back, but light and annulated at the sides. There are also from six to eight transverse wrinkles on all but the thoracic and caudal segments. The head, anterior segments and spiracles incline to flesh color, the prolegs and caudal plate deep brown. The largest segment in the body of the larva is the third behind the head, and into this, when at rest, is usually withdrawn the head and two anterior segments as shown in the figure.

When full grown and about to transform to a chrysalis, the color of the caterpillar often changes to that of a beautiful pink or crimson. It then descends to the ground and burrows underneath, and there undergoes its transformation to the pupa state within a smooth cavity.

The chrysalis (fig. 6) is of a dark shining mahogany color, roughened especially on the anterior edge of the segments in the back. It remains

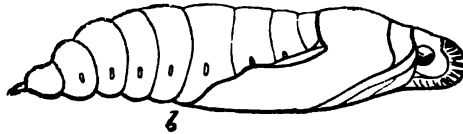


Fig. 6.

in the ground through the fall, winter and spring months, producing the moth the following summer.

VARIATIONS IN THE WING EXPANSE OF PEZOTETTIX.

BY G. M. DODGE, GLENCOE, NEBRASKA.

In the CAN. ENT., vol. ix., p. 112, I have described as a new species, under the name of *Caloptenus volucris*, a long-winged variety of *Pezotettix autumnalis* Dodge. I separated it because of its great length of wing, in which respect it equals many specimens of *Cal. spretus*, while in the typical *autumnalis* the elytra are very short, ovate and pointed. It also exhibited some variations in color. The latter I have since seen paralleled in *autumnalis*, and having found long-winged varieties of two other species of *Pezotettix*, I am now fully satisfied of the varietal character of *volucris*.

All the authorities agree in making the lack of wings, or the abbreviated character of those organs, the principal reason for separating the genus *Pezotettix* from *Caloptenus*. My experience shows, however, that the length of wing in these insects cannot be relied upon as a specific distinction even. It is plain that these long-winged varieties by in-breeding might establish a local variety of what would appear to be *Caloptenus*, but which would in reality be *Pezotettix*. It is possible, then, that all our species of *Caloptenus* were originally *Pezotettix*; that, by acquiring additional means of locomotion, were enabled to survive their ignoble relatives. This would certainly accord with the natural law of the "survival of the fittest."

One of my species, *Pezotettix alba* Dodge, seems to exhibit a transition from something still lower. I have an example in which the elytra are barely one-tenth of an inch in length, only half as long as in the typical or common form. In this specimen the cerci are much smaller than usual, although the insect is of the common size.

I do not yet know whether these variations in wing expanse are common to both sexes or not. I have so far found them only in male specimens, but that is no proof that winged females do not also occur.

Lest any should imagine that I am wrong in determining these long-winged specimens to be varieties rather than species, I will say that these species of *Pezotettix* are not liable to be confounded with any *Caloptenus* and that the varieties do not, with the exceptions already mentioned, differ in form or color from the types.

Pezotettix alba is particularly distinct, being white or greenish-white in color, and occurring only upon a native plant whose stems and foliage are also white. This plant, commonly, but incorrectly, called wild sage, grows in clumps many rods apart upon the prairie; but the insect is never found upon the intervening grass. The winged variety was also found upon the same plant.

The following shows the comparative length of wing in these varieties:—

<i>Pez. alba</i> Dodge.	<i>Pez. junius</i> Dodge.
Variety, ♂—Length of elytra, .10 inch.	Type, ♂—Length of elytra, .40 to .45 inch.
Type, ♂—Length of elytra, .175 inch.	Type, ♀—Length of elytra, .45 to .50 inch.
Type, ♀—Length of elytra, .20 inch.	Variety, ♂—Length of elytra, .70 inch.
Variety—Length of elytra, .50 or .60 inch.	

Pez. autumnalis Dodge.

Type, ♂—Length of elytra, .20 to .23 inch.
“ ♀ “ “ .26 inch.
Variety “ “ .70 “

The Caloptenoids are not more constant in color than other genera of Acrididæ, red-legged ones producing blue-legged varieties, and *vice-*

versa. Worthy of special mention are two males and a female, of the red-legged *C. spretus*, with hind tibiae pale blue. As I found them all in one locality, they were probably produced from one batch of eggs. *C. minor* Scudd. has a red-legged variety here. Have taken many specimens, but all were females.

DESCRIPTION OF THE PREPARATORY STAGES OF NEONYMPHA EURYTRIS.

BY W. H. EDWARDS, COALBURGH, W. VA.

EGG—Sub-globose, well rounded in every part, but somewhat broadest below the middle; wholly covered by fine, irregularly hexagonal reticulations, scarcely raised above the surface; color yellow-green. Duration of this stage 8 days.

YOUNG LARVA—Length .08 inch; cylindrical, thickest in middle, tapering pretty evenly either way, the last segment ending in two short tails; body covered with fine white hairs, slightly recurved; color pink-white, marked longitudinally by seven crimson lines, one of which is medio-dorsal, and three on either side; head sub-globose, nearly twice as broad as any body segment, flattened frontally, depressed slightly at top, and with a small conical process upon each vertex; color dark brown. To next stage 7 days.

AFTER FIRST MOULT—Length .16 inch. Body flat at base, rounded dorsally, and arched in middle segments, the sides sloping; the tails short, conical; color drab, either of a green or red tint, individuals varying; striped longitudinally with dull red, there being a narrow medio-dorsal stripe of this color, and two others on middle of each side; the whole surface finely but roughly tuberculated, the tubercles being irregular in size and length, sharp, and each emitting a short hair; colored also according to the ground they occupy; head sub-pyriform, flattened frontally, truncated at summit, and on each vertex a small rounded red process; color of head yellowish, finely mottled with red. Duration of this stage 6 days.

AFTER SECOND MOULT—Length .24 inch. Shape as at last stage ; a fleshy ridge over the feet ; color dull ochrey-yellow, striped with brown ; the dorsal stripe broad and dark, and a similar one on the lower part of the side ; two narrow stripes on the middle of each side, paler colored ; the tails reddish at tips ; surface of body as before ; head shaped as before, yellow, the upper front crossed by two arched rows of rounded brown patches. To next moult 14 days.

AFTER THIRD MOULT—Length .44 inch. The middle segments stouter, the base broader, than before ; color pale ochre-yellow somewhat mottled with reddish on dorsum, but variable in this respect ; the lateral stripes sometimes nearly or quite obsolete, and in place of the upper one is a dark point or spot at the extreme hinder part of each segment from 4 to 10 ; behind this the side is mottled with a darker shade than the ground ; the basal ridge buff ; surface more roughened than before ; head nearly as before, the spots on the face darker, and a third row appears faintly below the others. To next moult 30 days.

AFTER FOURTH AND LAST MOULT—To maturity——days.

MATURE LARVA—Length 1 inch. Body flat at base, the dorsum rounded, much arched on middle segments, the sides flat and sloping ; over the feet a fleshy ridge ; the second segment constricted much as in *Hesperia* ; the last segment bifurcate, each fork short, pointed, divergent ; color of dorsum yellow-brown ; of sides, darker ; a medio-dorsal band dark brown, and on either side of this on each segment from 4 to 11 is an indistinct dark patch ; the lateral area separated from the dorsal by two wavy parallel lines, the upper one dark, the other yellowish ; on the side of each segment from 5 to 11 is a dark oblique stripe ; the basal ridge yellowish ; the tails tipped with red ; the whole surface covered with sharp tubercles of irregular sizes and colored as the ground, each emitting a short brown hair ; feet and legs yellow-brown ; head sub-pyriform, flattened in front, truncated at summit and slightly depressed ; the vertices a little produced, pointed and compressed ; color yellow-brown, finely tuberculated ; the face crossed by three rows of rounded brown patches.

CHRYsalis—Length .5 inch. Same shape as *sosybius* ; cylindrical, the abdomen stout and larger than the anterior portion ; mesonotum rounded, arched ; the head case truncated abruptly from the base of the mesonotum, narrow ; wing cases somewhat flaring at base ; the neuration of the wings seen distinctly ; color pale yellow-brown, the wing cases and

anterior parts streaked with fine, abbreviated, brown lines ; on the margins of the wing cases a series of dark brown spots ; beneath the abdomen two brown stripes, and on the middle of each side a row of brown points extending from the mesonotum to extremity. Duration of this stage 11 days.

Eurytris is a common species in this section of West Virginia, found in the borders of the forest and in the adjacent fields, especially if these last are more or less overgrown with brambles, &c. The eggs are easily obtained by confining the female in a box, or over a flower pot in which a bit of sod has been placed. They are laid upon the grass, or dropped loosely upon the sod or the earth. The first eggs so obtained by me were laid 30th May. The earlier stages were rapidly passed, as related above, but the last were very much prolonged. About 20th July, soon after the third moult, the larvæ all ceased feeding, and some appeared to be in profound lethargy. But others, after resting for several days, would arouse and eat a little, then sleep again. But every one, notwithstanding the lethargic condition, was found to have changed its position several times. After keeping them so two weeks, I left home for some months, and on my return found all were dead. But one larva that I had sent to Miss Peart before 20th July went on to imago, and I inferred that probably some of the others would have done so after sleeping for an interval, had I been at hand to feed them. This was in 1876. In 1877 I raised a small brood from eggs obtained 31st May. With these every stage of the larvæ, after the first, lingered. When about to moult the larva remained for three or four days before this event motionless, and as many after, and there were periods of several days between the moults when they rested and took no food. As I kept them in small glasses it was easy to determine this. The larva is sluggish at all times, moves very little and with great deliberation. Part of this brood at last ceased feeding altogether and contracted themselves for a long sleep. But I eventually lost all but one of these, probably from the heat of the weather, as one after another dropped off its support, dead. The single larva spoken of continued to feed and reached the length of about one inch, when winter set in, and I then set it in a cold room to preserve it till spring. By an accident this one was lost in January. It appeared to be healthy up to this time, and the imago would probably have emerged from chrysalis in early spring. It will be seen that breeding these larvæ is an excessively tedious matter, requiring months to perfect, and involving many risks. As fresh butterflies

of *Eurytris* are flying here in the fall, there are of course two broods, but breeding shows that some of the larvæ of the first brood became lethargic in summer, and so they pass the winter. The larvæ of the second brood doubtless pass the winter in their earlier stages, and begin again to feed early in the next season.

Mr. Scudder, Trans. Am. Ent. Soc., 1877, p. 74, has spoken of the marked resemblance between the imagos of the Satyridæ and Hesperidæ in many important features, and calls attention to the very great similarity between the chrysalids of the two families. I concur with him fully in these respects, but I would suggest that the resemblances between the larvæ and their behavior is often just as great. I am more and more satisfied from the study of the preparatory stages of the Satyrids, that their true place in classification is very near the Hesperidæ.

DESCRIPTION OF A NEW BRONCHELIA.

BY W. V. ANDREWS, BROOKLYN, N. Y.

Bronchelia gravilinearia, n. sp. -

The general ground color of this species is a light brown, approaching a fawn color. The palpi, however, are of a dark brown.

F. w.—Wing stretch $1\frac{3}{4}$ in. There are five distinct, dark brown, transverse bands, all commencing on the costa. The first two basal, and rather close to each other; the inner of the two somewhat broken. The third very heavy. The fourth is much narrower than the third, and commences on the costa at about one-tenth of an inch from the third, curving until it touches it at about mid-wing, thence running nearly confluent with it to inner margin. The fifth band is not quite so heavy as the third, and is broken at about the third nervule. All the bands curve towards the base, but are not quite parallel. The space between the fifth band and outer margin is thickly covered with scales of the same dark brown as the bands. Outer margin slightly notched, with a row of dark brown lunular marks. All the bands, except one and two, are extended across the hind wings.

H. w.—The heavy third band of *f. w.* is equally heavy on *h. w.*, and is bisected at a right angle by a heavy brown line, forming a T mark. The slight fourth band commences on this wing at about the same distance from the third as it does on *f. w.*, and runs a zigzag course to inner margin. The fifth band is broken, as described on *f. w.* The outer margin of this wing is more deeply notched than the outer margin of *f. w.*, and the lunar marks are more distinct, and are larger. All the markings are of the same dark brown color.

In general appearance this species differs greatly from *hortaria*, the dark scales being much less diffused.

The under side of both wings is concolorous, or nearly so, with their upper side, with very few scattered brown scales. Of the *f. w.* under side all the bands of the upper side are distinct and clear except the first. Of the *h. w.*, the bands are much fainter, the third and fifth being the heavier, while the fourth is scarcely perceptible.

A single ♂ specimen from Indiana. Coll. W. V. A.

I hesitated for some time before venturing to describe this species, thinking it possible that it may be Gueneé's *B. dendraria*, but Packard's statement that the third and fourth lines of *dendraria* were broad, confused and blended, does not apply to the example before me.

MICRO-LEPIDOPTERA.

BY V. T. CHAMBERS, COVINGTON, KY.

CORISCUM.

C. 5-strigella Cham.

By a slip of the pen the description of this species contains the following sentence: "Annulus about its middle at the tip." It should read: "Middle and another at its tip." There are several indistinct costal streaks besides the five larger ones from which it takes its name, and there are four brown spots or longitudinal dashes along the line where the general brownish-gray color of the wing meets the white dorsal part.

COLEOPHORA.

C. gigantella Cham.

A typographical error in the original description makes it read "*these* are in the apical part of the wing" for "*three* are in," etc. The species was described from a single specimen from Canada, and was placed in the section "having the palpi simple." Since then I have bred it from cases found in May attached to Maple trees (*Acer saccharinum*), in Kentucky. The specimen in Mr. Saunders' collection had probably been a little injured in setting, as in the bred specimens I find there is a minute tuft at the apex of the second joint of the palpi, and there is also an ochreous streak from the base along the dorsal margin of the fore wings.

Among the European species figured in the *Nat. Hist. Tin.*, *C. virgauræ* most nearly resembles this species, which, however, is larger than *virgauræ* and has no brown dusting on the wings. *Virgauræ*, likewise, has the costa narrowly white to the middle, whilst in *gigantella* the extreme costa is of the same pale brownish ochreous with the streaks on the wing. The streaks on the fore wings are in other respects alike in the two species. The hind wings, abdomen and anal tuft are gray (in *virgauræ* the tuft is yellowish ochreous). The ciliæ of the fore wings are a little paler and more grayish than the streaks on the wings, and the outer surface of the palpi is brownish ochreous. The larval case is of the same form in this species as in *virgauræ*, except that it is a little more slender, and it is of a sordid brownish-yellow color. The imago comes out in the latter half of June.

C. shaleriella Cham. resembles *gigantella* closely, but is a little larger, having an *al. ex.* of $\frac{1}{16}$ inch, while that of *gigantella* is five lines; and in *shaleriella* the antennæ are not annulate with brown.

Both of these species approach *C. cratipennella* Clem. Dr. Clemens gives no measurements, and I have not seen his species; but from his account of it, it would seem to differ from *gigantella* and *shaleriella* by the unusual width of the streak which extends along the wing between the costal and subcostal veins, and by "the stripe along the subcostal vein which sub-divides into two branches terminating on the costa," and in the number and course of the streaks in the apical part of the wing; the color of the basal portion of the costa is not stated by Dr. Clemens.

I have no specimen of *shaleriella* for comparison now, and it may prove to be identical with *gigantella*.

C. fagicorticella Cham.

This species does not closely resemble any of those figured in *Nat. Hist. Tin.*; the larval case, however, resembles that of *C. murinipennella* in form. The imago is perhaps more like *C. Gnaphalii* than any other there figured. The palpal tuft is very small and the *al. ex.* varies from something over $\frac{1}{3}$ to about $\frac{1}{4}$ inch. The wings are very indistinctly marked, and the yellowish tinge of the apical portion of the primaries is faint. There is a wide, pale yellowish-ochreous streak along the dorsal margin; indeed sometimes the entire dorsal part of the wing beneath the fold is of that color, and the furcate yellowish streak above the fold is so close to it that one sometimes may fail to observe that the fold itself is whitish. Very faint lines may also be observed along the course of the veins in the apical part of the wing, and their course in perfectly fresh specimens is made more distinct by lines of sparsely dusted brown scales which margin them; the streak along the costa is also very indistinct. Ciliæ of fore wings pale yellowish; hind wings and their ciliæ, and abdomen, gray; anal tuft white. Length of larval case $2\frac{1}{2}$ lines.

C. unicolorella Cham.

This species was described from captured specimens, and I have since bred it. The larval case does not closely resemble any of those figured in *Nat. Hist. Tin.* It is most like that of *virgaurea*, but is much shorter in proportion and smaller every way, with the anterior end curved downwards. It is grayish or ochreous, with little blackish specks adhering to it. Length $2\frac{1}{4}$ lines.

The imago is sometimes a little larger than the dimensions given ($\frac{1}{4}$ inch), reaching $\frac{3}{8}$ inch *al. ex.* It is proper to add that the hind wings and upper surface of the abdomen are slate color, the under surface of the abdomen yellowish, and the antennæ very faintly annulate with yellowish. Otherwise the entire insect is as I have described it, of a grayish drab color. Of the species figured in *Nat. Hist. Tin.*, it seems to come nearest *siccifolia*, having the hind wings wider than in the other unicolorous species there figured; but the fore wings are rather darker than in that species. The case is very common in May, adhering to the bark of forest trees, but the food plant is unknown.

C. linea-pulvella Cham.

Palpi tufted; antennæ with the basal and a few following joints a little enlarged. Head and appendages pale ochreous, the outer surface of the

palpi brownish, and the antennæ with alternate annulations of dark ochreous and white. Fore wings ochreous, with *white lines so densely dusted with dark brown or blackish scales as almost to conceal the white*; one of these extends along the costal margin; another from the base to the apex, giving off three branches to the costal margin, the first being emitted just before the middle; another extends along the fold, and there is a more indistinct one along the dorsal margin. Hind wings fuscous; abdomen dark lead color above, paler and more ochreous below. *Al. ex.* 5 lines. Ky., June 21st (some specimens in Cambridge Museum are labeled by mistake *nigripulvella*). The basal joint of the antennæ is but little larger than those immediately following, but these are themselves a little enlarged.

C. argentella.

This is *C. argentialbella* Cham., CAN. ENT., v. 7, p. 75, and *Bul. Geo. Survey* (Hayden), v. 3, pt. 1, pp. 133 and 141—not *C. argentialbella* Cham., CAN. ENT., v. 6, p. 128. *Argentella* is heretofore known only from Texas and Colorado, but I have also since taken a single specimen in Kentucky. When it was first described I had no means of reference to my collection of Kentucky species, nor to my notes or published descriptions, and the previous use of the name *argentialbella* for the smaller Kentucky species escaped my recollection. *Argentialbella* is retained for the smaller, and first described species, known as yet only from Kentucky; *argentella* for the larger species.

C. bistrigella Cham.

There seems to be much difference in the intensity of the yellow streaks on the fore wings and the amount of brown dusting along the margins of the streaks. The single specimen taken in Colorado was somewhat worn, and all my specimens from Texas had been captured for a good while, and the colors may have faded somewhat. It may turn out, on the examination of fresh specimens, that it is identical with *C. basistrigella* Cham. from Colorado, which is only known by a single specimen, which, however, is in perfect condition. Neither has been found except in Texas and Colorado as yet.

C. caryaefoliella.

C. cretaticostella ? Clem.

C. rufoluteella Cham.

Dr. Clemens gave names to several species which were known to him only by the food plant, larval case or larva. Among these he mentions a species feeding on Hickory leaves under the name of *caryaefoliella*. He also describes a captured imago under the name of *cretaticostella*, but the description is so very brief and insufficient that without seeing his specimen I cannot be altogether certain that it is identical with that bred by me from larvæ feeding on Hickory leaves. His description, however, of *cretaticostella*, such as it is, is applicable to the Hickory-feeding species bred by me. I know three species feeding on Hickory leaves, but have only succeeded in rearing the imago from one, and as that one agrees in the characters of the case and larva with the case and larva mentioned by Clemens, I adopt the name suggested by him. His species *cretaticostella* was described in January, 1860, and his mention of the larva and case of *caryaefoliella* under that name was in 1861, so that the former name would be entitled to priority; but as there may be doubt whether the species are the same, and as the description of *cretaticostella* is so imperfect, and as, on account of the ease with which bred species may be identified, it is always desirable that the specific name should be derived from the food plant, I adopt *caryaefoliella* for this species.

C. rufoluteella Cham. is known only from captured specimens. I have always found it in abundance about the middle of July, resting upon palings in Linden Grove Cemetery, in Covington, Ky., a mile away from any Hickory trees. There it always makes its appearance suddenly and in considerable numbers, so that I have always supposed it to be a feeder on some species of plant found in the cemetery enclosure. I am, however, utterly unable to distinguish it from specimens bred by me in the latter part of June from larval cases found feeding on Hickory leaves in the manner described by Dr. Clemens for *caryaefoliella*, and I believe it to be the same species.

The species of this genus pass by such gentle gradations from those having the antennae densely clothed with scales, or the basal joint of it tufted or greatly enlarged, and with the second joint of the palpi distinctly tufted, to those in which both antennae and palpi are simple, that these characters afford little assistance in subdividing the genus. It is sometimes difficult to determine whether we should say "the basal joint of the antennae tufted," or only "enlarged," and so as to the palpi. Thus formerly (CAN. ENT., v. 6) I placed *rufoluteella* in the section "basal joint of antennae with a small tuft, palpi simple." But it now seems to me that

it would be more correct to say "basal joint of antennae somewhat enlarged ; second joint of palpi with a very minute tuft."

The species is ochreous ; the head and palpi pale or yellowish ochreous ; the antennae white, annulate with brown ; fore wings reddish ochreous, darker towards the apex, with the costal margin from base to ciliæ white.

The larval case is ochreous red, cylindrical, laterally compressed at the hinder end, and over three lines long. It is attached to the under side of the leaves of *Carya alba*, and the larva eats out the parenchyma in little patches approaching a square form.

The ornamentation of the imago is nearer that of *C. limosipennella* than to any of the other species figured in *Nat. Hist. Tin.* *Al. ex.* $4\frac{1}{2}$ lines.

C. Vernoniaella, n. sp.

This species, like many others which I do not specially name, is known only by its larval case, and I refer to it simply on account of its great size. It is about an inch long and slender, reminding one somewhat of the basal half of a "darning needle." The larva feeds on leaves of the Iron-weed (*Vernonia*). Miss Murtfeldt informs me that she has found it in Missouri, and I have found it in Kentucky.

There are two species besides *caryaefoliella* feeding on Hickory leaves. One of these makes a very small case, laterally compressed and but little more than a line long. Another makes a case about the size of that of *caryaefoliella*, but it is also somewhat laterally compressed, and the case having been cut out of the edge of the leaf, the upper edge of it shows the serrations of the leaf.

There is also a species making a pistol-formed case that feeds on Chestnut leaves. And the large blackish pistol-formed case of *C. tilliaella* Clem., the larva and case only of which are known, is also found here occasionally. I have also met with a small pearly-white case less than two lines long, and a white fusiform case one-half an inch long, besides many others found in this locality. A species which feeds on Blackberry leaves (*Rubus villosus*) makes a case out of the edge of the leaf, showing the serrations on the dorsal edge.

WINTERING VANESSA ANTIOPA.

BY C. G. SIEWERS, NEWPORT, KY.

This beautiful diurnal—the “Camberwell Beauty” of England, and very inappropriately styled the “Mourning Cloak” by Americans, for is it not clothed in a mantle of imperial purple, fringed with gold lace?—is well known to hibernate. It is occasionally found in stone piles in the winter, but I think its most common hiding-place is in the culvert walls of our country roads and turnpikes. It requires a cold, moist, dark place, or it will dry up.

Capturing a fine female on the 9th of October, 1876, I concluded to winter it. Placing it in a net cage with a dish of apple, sugar and water, I supposed my share of the performance over. It fed for several weeks, then fluttered a good deal and died the beginning of December. It had fairly dried up. This showed bad management. Last fall, on September 7th, passing a tree sugared the night before, I captured another female. This one I placed in a paper box eight inches square and high, removed the core of half an apple, sliced off a bit of the round side to steady it, placed it in a small two-inch dish, covered with sugar, and filled up with water. Once a week I renewed the water and sugar. It placed itself on the side of the box, directly over and within reach of the dish, and how ever I moved the apple I always found that it followed it around.

It evidently fed on warm days, but never opened its wings. I kept it in an up-stairs, cold room, where water would freeze, but still not as cold as out doors. It allowed me to handle it, and would lie flat on my hand without movement. In February I thought there were symptoms of weakening. It no longer perched on the side of the box, but remained on the bottom, leaning over very much to one side.

Placing it in sunshine the last week of February, it began to open its wings little by little, with short jerks, as if the tendons were loosening. When half open it was put away again. On the 11th of March, a warm cloudy day, I took it on my finger to an open window. While looking at its clear eyes the sun suddenly shone out, and the next moment it was gone. I had proposed to try and find a mate for it, but concluded to keep it till others were flying, and then take it to its old neighborhood and let it go. As it took the direction of its place of capture I was pretty sure

to see it again, and found it four days after in a sugar camp in the same woods. I recognized it at once by a bad bend in the tip of the wings, caused by a jam of the dish slipping on it.

On the 27th of March, two weeks later, the first *antiopa* appeared. I have so far failed to take the larva, but have just seen several imagines in a willow thicket, which gives me hope. They are usually rare, but some years their numbers make them a nuisance. Their color is dark purple with strong black spines. Food plants—Lombardy poplar and willow.

INSECTS OF THE NORTHERN PARTS OF BRITISH AMERICA.

COMPILED BY REV. C. J. S. BETHUNE, M. A.

From Kirby's Fauna Boreali-Americana : Insecta.

(Continued from Vol. ix., p. 156.)

[254.] V. HYMENOPTERA.

FAMILY MEGACHILIDÆ.

375. *MEGACHILE MARITIMA* Stephens.—Length of body 7 lines.

[271.] Body black, pubescent, thickly and minutely punctured. Mandibles very large, triangular, protended, not crossing each other, armed with four terminal teeth; face between the eyes thickly clothed with brown hairs, which grow tawny towards the mouth; antennæ filiform; back of the trunk clothed with brown hairs less thickly in the disk; wings a little enbrowned, especially at the apex; nervures dusky; base-covers piceous; legs hairy with pale hairs; abdomen subovate with the three last segments fringed with pale hairs intermixed with black; the ventral hairs are tawny, paler towards the base, and darker towards the apex.

FAMILY ANTHOPHORIDÆ.

376. *ANTHOPHORA BOMBOIDES* Kirby.—Length of body 6 lines. A single specimen taken in Lat. 65°.

Body black, thickly punctured, clothed like that of a humble-bee with dense pallid hairs. Head triangular, upper lip subquadrangular, white with a black dot at each upper angle; nose white, naked; a bunch of whitish hairs conceals the base of the antennæ; antennæ filiform, scarcely longer than the head; vertex with some black hairs thinly scattered; occiput fringed with whitish ones; trunk subglobose, set with longish white hairs; hairs of the legs mostly black; tarsi piceous; the first or dilated joint is armed with a strong and sharp tooth on the inner side at the base; wings subhyaline with black nervures; abdomen between globose and triangular, with the three first dorsal segments clothed with long whitish hairs, and the tail and ventral segments with black.

[272.] FAMILY BOMBIDÆ.

377. *BOMBUS SYLVICOLA Kirby*.—Length of body 7 lines. A single specimen taken in Lat. 65°.

General hirsuties of the upper side of the body yellowish. Head with a tuft of the same colour below the antennæ, and another at the vertex; trunk with a broad black band between the wings; hairs of the thighs yellowish; those of the tibiæ black; tarsi more or less covered with short decumbent pale hairs; wings somewhat embrowned, with black nervures; abdomen with a broad, mesal, ferruginous band.

378. *BOMBUS BOREALIS Kirby*.—Length of body 8 lines. Several taken with the preceding.

[273.] Body clothed underneath with black, above with tawny, hairs. Face and vertex with a tuft of yellowish ones; thorax, between the wings, with a black hairy band; wings somewhat embrowned with black nervures; legs black; abdomen above with a thick coat of tawny hairs palest at the base; anus black.

379. *BOMBUS TERRICOLA Kirby*.—Plate vi., fig. 4.—Length of body 9 lines. Taken with the preceding.

♀. This species approaches very near to *B. terrestris*, but the whole upper surface of the abdomen is clothed with yellow hairs, with the exception of the first segment, the hair of which, and a band near the anus, are black; the extremity only of the latter is dirty-white; there are a few yellow hairs on the metathorax; and the wings are embrowned. In *B. ter-*

restris the abdomen is black, with a yellow band, and the two last anal segments are white ; there are no yellow hairs on the metathorax, and the wings are much clearer.

380. *BOMBUS DERHAMELLUS Kirby*.—Length of body 8 lines. Taken with the preceding.

♀. Body hairy, black. Head with a tuft of yellowish hairs on the vertex ; thorax yellow, black between the wings ; wings more embrowned than in the male ; abdomen yellow at the base with a black posterior band ; anus ferruginous.

[274] 381. *BOMBUS PRATICOLA Kirby*.—Length of body 7 lines. Taken with the preceding.

♀. Body black, clothed above with yellowish hairs. Head with a tuft of yellowish hairs below the antennæ, and on the vertex ; thorax black between the wings, which are embrowned ; legs with yellow hairs at the base ; anterior half of the abdomen yellow, posterior ferruginous.

382. *BOMBUS VIRGINICUS Linn.*—Length of body $8\frac{1}{2}$ lines. Locality uncertain.

♀. Hairs of the body in general black, except a tuft on the vertex behind the antennæ, the anterior and posterior extremities, and sides of the thorax, and the first segment of the abdomen, which are clothed with yellowish hairs ; between the wings the thorax is black ; the tarsi are rufous ; the wings are rather embrowned, most so at the apex ; nervures black.

ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The Annual Meeting of the above Club will be held in St. Louis, Mo., on Tuesday, August 20th, the day preceding the meeting of the Association. It is hoped that all Entomologists who can possibly do so will be present on that occasion.

BOOK NOTICES.

Manual of the Apiary, by Prof. A. J. Cook, Lansing, Mich. Octavo pp. 286, with 110 illustrations ; published by Thos. G. Newman & Son, Chicago.

We are indebted to our esteemed friend Cook for a copy of the second edition of this excellent work on Bee Culture, treating of the art in all its different branches in a clear, concise and interesting manner, showing throughout the author's thorough knowledge of the subject on which he writes. The work is divided into two parts, the first of which treats of the natural history of the Honey Bee, the second on the Apiary, its care and management. It is well got up and the illustrations are very good ; we feel a pleasure in recommending it to all those interested in Bee Culture. The fact that the first edition of 3,000 copies issued less than two years ago is exhausted, shows that the public have appreciated the author's efforts.

Antigeny, or Sexual Dimorphism in Butterflies, by Samuel H. Scudder, 8vo., pp. 8, from the Proceedings of the American Academy of Arts and Sciences, vol. x.

The Insects of the Tertiary Beds at Quesnel, British Columbia, by Samuel H. Scudder, 8vo., pp. 15. From the Report of Progress, 1875-76, Geological Survey of Canada, containing descriptions of twenty species of fossil insects.

Additions to the Insect Fauna of the Tertiary Beds at Quesnel, British Columbia, by Samuel H. Scudder. From the Report of Progress, 1876-77, Geological Survey of Canada, 8vo., pp. 8, containing descriptions of six species of fossil insects.

Fossil Coleoptera from the Rocky Mountain Territories, by Samuel H. Scudder. Extracted from Bulletin of the Geological and Geographical Survey of the Territories, Vol. ii., No. 1, 8vo., pp. 10., in which are described 31 species of fossil Coleoptera.

Notice of the Butterflies collected by Dr. Edward Palmer in the arid regions of Southern Utah and Northern Arizona, during the summer of 1877, by Samuel H. Scudder. From the Bulletin of the Survey, Vol. iv., No. 1, 8vo., pp. 5, containing references to 41 species. We are very greatly indebted to the author for kindly sending us copies of the above valuable papers.

Field and Forest. This excellent monthly journal of Natural History continues to be well sustained. Among articles of especial interest to Entomologists we notice papers in the January and March numbers, by W. H. Edwards, of Coalburgh, W. Va., containing descriptions of nine new species of butterflies found in Colorado and Texas.

The Journal of the Cincinnati Society of Natural History; 1ge., 8vo. pp. 52, with two plates. Terms, \$2 per vol.; single numbers, 60 cts. The first number of this new quarterly journal of Natural History is at hand. Besides matters of local interest connected with the Society, the present number contains a paper "On the Tongue of some Hymenoptera," by V. T. Chambers; a catalogue of the Lepidoptera observed in the vicinity of Cincinnati, by Charles Drury, including 475 species; Contributions to Palæontology, by S. A. Miller and C. B. Dyer, and a description of *Pupa Cincinnatiensis*, by C. R. Judge.

Bulletin of the Buffalo Society of Natural Sciences. Part 5 of Vol. 3, the closing number of the volume, is at hand, containing papers by Henry R. Howland, on Recent Archæological Discoveries, illustrated by three photographic plates; D. S. Kellicott, description of a new species of *Argulus*, and a new Check List of North American Sphingidæ, by Aug. R. Grote.

CORRESPONDENCE.

PAPILIO THOAS.

It may be of some interest to the readers of the CANADIAN ENTOMOLOGIST to know that one specimen of *Papilio thoas* was captured in Hamilton last summer, in the south-eastern part of the city, and one specimen on the G. W. R. track near Dundas. Both specimens were badly broken. Mr. D. Little has the one here, and Mr. R. Kyle, of Dundas, has the other.

WILLIAM MURRAY, Hamilton, Ont.

We captured at Center, N. Y., April 24th, *Smerinthus cerisii* in excellent condition. So far as I am aware, it has never been taken in this region before. You see Center still holds her own, and every season yields up new treasures.

JAMES S. BAILEY, Albany, N. Y.

The Canadian Entomologist.

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No. 7

THE GENERA OF THE HESPERIDÆ OF THE EUROPEAN FAUNAL-REGION.

BY DR. A. SPEYER.

(Translated from the Stettiner Entomologische Zeitung for 1878, pp. 167-193.)

[Of marked value, as is everything upon the Lepidoptera proceeding from the pen of Dr. Speyer, the present paper—an arrangement of the Hesperidæ which will generally be conceded to be quite in advance of any heretofore presented—will prove of special interest to the American student, in connection with the arrangement a short time ago presented by the same author, of some of our American species (Edwards' *Catalogue of the Lepidoptera of North America*), associated with the European species (my *Entomological Contributions*, No. iv., p. 71). The admirable discussion in this paper of the value and relative importance of the several structural features of the Hesperians, cannot fail of being of eminent service in the systematic arrangement of our numerous species. Great care has been taken with the translation to render it a faithful one. The thanks of the appreciative reader are due to Mr. W. H. Edwards and Mr. O. von Meske for providing for the translation, and to Prof. Uhler for its supervision. The remaining two-thirds of the paper will be given in the two following numbers of this journal.—J. A. LINTNER.]

A task set for me by American friends* induced me to undertake, in connection with the North American Hesperidæ in my own collection,

* I have been able to comply with the wish of my friends, to aid them in the arrangement of the Hesperidæ (for the purpose of publishing a new *Catalogue* of their Rhopalocera) only within the narrow limits to which I am confined by my very imperfect acquaintance with the American species of the family. In addition to the statement

also, a revision of the European species; the result of which I here submit, although the work is not so thorough as it should have been—some subjective deficiencies pertaining to it, as the non-examination of the neuration of the wings, etc.

The European Hesperian Fauna is so poor in species that, in comparison with the Fauna of the whole world, it is almost lost: even with the addition of the much richer Fauna of temperate North America, still appearing as only a small fragment of the whole, affording no satisfactory insight into the correlation of the forms, and causing the arrangement and limitation of the species to remain uncertain.

But so long as we are without a general system of the Hesperidæ which would meet present requirements, nothing remains to be done but to work up the individual Faunæ for one's-self: in order, in the first place, to meet the absolute wants of our collections and special catalogues, and secondly, to prepare the way for a complete work at some future time. That the attempts made hitherto to divide this multiform family into genera have remained rather unsatisfactory will not be disputed, and possibly least of all by the excellent authors themselves. Herrich-Schæffer, at least, who in the true scientific spirit undertook such a task in his *Prodromus Systematis Lepidopterorum* (1868), plainly understood its imperfection. It is, however, much to be regretted that this great work, based upon such comprehensive studies, has not been completed, for, as is known, it remains as a fragment.

already made in the Catalogue which I have received through the kindness of the author (*Catalogue of the Lepidoptera of America, North of Mexico, Part I., Diurnals*: By W. H. Edwards, Philadelph., 1877), I would remark, that, of the one hundred and eleven species there included, only forty-four have been in my possession, and that the American representatives of the genera *Carterocephalus*, *Thymelicus*, *Lintneria*,† *Achlyodes*, *Erycides*, *Pyrrophysa* and *Megathymus* have been entirely wanting. That the generic diagnoses prepared by me somewhat hastily should have the honor of publication, I neither expected nor desired. How far these diagnoses will be sustained in their extension to the species unknown to me, and whether, and how far especially, the entire classification would have been modified, if instead of a part only, the whole number of species in nature were known to me, I am at present unable to judge. Finally, that Mr. Scudder, and not myself, is the author of the genera *Amblyscirtes* and *Pholisora*, has already been mentioned by Mr. Edwards. The genus *Thymelicus* Herrich-Schæffer (*Prodromus*, etc., p. 44, 1867) had already been well characterized.

† [This name having been previously used by Mr. Butler, for a genus of the Sphingidæ, it has been withdrawn by its author, and *Systus* substituted for it. See this journal, vol. ix., p. 120.—J. A. L.]

The Hesperidæ are regarded by me as a group equal in systematic value to all the other Rhopalocera, and one which forms a transition to the Heterocera. They approach the latter through the possession of an attachment to the anterior tibiæ, the double-spurred posterior tibiæ of most of the species, and in the pupa being enclosed in a net-work of threads. No other group of the Diurnals, so far as I know, has two pairs of spurs on the posterior tibiæ. Besides the Hesperidæ, the Papilioninæ (Equites) alone have the tibial epyphysis, and in these alone the thread-enclosed pupa is found, at least in one of the genera (*Parnassius*). In other respects, however, the Papilioninæ are far removed from the Hesperidæ.

The Hesperidæ are still more decidedly characterized as a genealogical transition group, between the Heterocera and the Rhopalocera, in that they possess besides, in particular cases, two characteristic physiological and anatomical peculiarities—the position of the wings when at rest, and the catch-bristle (*haftborste*) of the hind wings.

Nisoniades Tages carries its wings, as I have observed towards evening in sleeping examples resting upon flowers, directed backwards and sloping like the roof of a house, as in the night-moths. The same observation had already been made by Prof. Zeller, not only in *Tages*, but in freshly excluded examples of *H. malvarum* O., which last had the antennæ placed sideways and laid along the thorax, and the abdomen turned upwards, so that the observer was reminded of a sleeping *Heterogenea testudinana* (*Isis*, 1847, p. 288). Whether others have also made the same observations with this or other species, I do not know. I have not myself given the subject much attention. So far as I remember, I have always found the other Hesperians, when at full rest, sitting with erect wings, in the normal position of the Diurnals; but not with separated wings, as has been mostly stated.

A fully developed *retinaculum** occurs only in the male of *Euschemon rafflesiae* Macleay, and it is remarkable that the home of this singular genus is Australia, where so many primitive forms have been preserved that elsewhere have been overthrown by terrestrial revolutions, or destroyed by the concurrence of more progressive rivals.

Looking away from these possibly single cases, the Hesperidæ form a very natural, in themselves closed, division of the Diurnals, and as such

* [The *frenulum* of many authors. —L.]

much easier to circumscribe than to analyse as natural and sharply defined genera. To their characteristic peculiarities belong (after the venation of the wings, etc.) as an easy and evident characteristic, the brush of stiff hairs which springs from beneath the base of the antennae, which Hübner thought to be, in his definition of *Astyci* (Verz., p. 102), like the "curve on the cone of the ear." It arises very near the base of the antennae, between them and the upper margin of the eyes, and almost on the place occupied by the ocelli, but a little farther forwards, near the middle of the base of the antennae—the ocelli, when present, lying on the posterior margin. It is developed alike in both sexes, but varies in regard to length, form and color in the different genera and species. As a rule it is black, occasionally mixed with gold, rarely entirely rusty, or pale-yellow. Where it is particularly long and stout, as in *Pyrgus*, *Scalothrix* and *Nisoniades*, it is somewhat curved over the eyes, as if to serve as a shade for them. The inferior hairs are more elongated than the upper ones. It is very short in several *Pamphila* (*Goniloba*) species and in the American genus *Eudamus* (*Goniurus*), but is not entirely absent from any species examined by me. In some American genera this otherwise simple hair-formed structure, in which the hairs are close set, takes the form of a plate of hairs, by reason of their being spread out at the end, as in *Copaodes* sp., *Pholisora* Scudd. As a short character for this organ, we retain the name given by Hübner, "Lockchen" [a small lock of hair], although it is only by particular perfection to be compared to a lock of hair.

The appendage to the anterior tibiæ (epiphysis cruralis, *schienblattchen*)* a bare, mostly reddish-yellow, blunt thorn-shaped, or lancet-shaped, chitinous plate, projects, in the Hesperidæ, from the middle of the inner side of the tibiæ and reaches to their end. It lies quite close to the tibiæ, and its free surface is clothed with a flat tuft of hairs, so that the structure is sometimes not readily recognized. Its absence separates two (which perhaps should be united) natural genera, poor in species, from the remainder of the family.

That the presence or absence of the spurs on the middle of the posterior tibiæ is of as little use as elsewhere in founding genera, the already described genera will suffice to show. It even seems as if the Hesperidæ were destined to add to the, until now, single example of variability in

(* The tibial epiphysis of Guenee and of Edwards' Catalogue.—L.)

the number of spurs in the same species (*Acidalia rusticata*), a second instance of a varying species (see below *Pamphila Alcides*).

Of no more value in a systematic relation are the spines (*dornborsten*) of the tibiae, so far as I can judge from the limited number of species that I have examined. The genus *Pamphila* affords ample evidence of this; *Pyrgus*, also, attests to its truth, for its only spined species, *cribrellum*, no one would ever think of separating, because of this peculiarity, from *tessellum*, etc.

The spines the most generally occur on the middle tibiae, where they are always the most strongly developed; occasionally they are only present here. Then follow, both in frequency of occurrence and in their development, the posterior tibiae; and lastly the anterior tibiae. Often the spines of both these legs are so slight, or so covered up by hair and scales, that one has great difficulty in recognizing them, and their actual presence seems a matter of doubt. The manifold differences which are presented in the form of the club of the antennae are of value for systematic purposes; but, unfortunately, these differences are not often sharply defined and are difficult to express clearly in words. And there are not wanting species deviating from their generic association only in these points, that is to say, aberrant forms (such as *Pyrgus Poggeri*), which could not be separated without an unnatural disruption of genera.

The palpi, particularly in the form and direction of their apical joint, afford some useful generic characters, while they offer, also, negative indications similar to those taken from the form of the knob of the antennae. Some other valuable systematic peculiarities are developed only in the male sex, while the female has in general remained a step behind. Their use as generic characters, therefore, cannot be recommended in this, as in other difficult groups, nor can they be wholly dispensed with. To these belong the costal fold and the discoidal stigma of the fore wings, the hair-pencil of the hind tibiae, the appendages of the hind breast,* and the abdominal fossa (*bauchgrube*).

The costal fold affords in the European species, in which it is present, only unimportant differences. It begins near the base of the anterior margin and terminates on or near its middle. The portion of the anterior margin, which it here covers, is not clothed with scales, but with a peculiar

* [*Hinterbreust*: - *Metasternum* (Burmeister), *postpectus* (Kirby)—L.]

coat of felt, the color of which differs from that of the rest of the surface. With only one exception (*Pyrgus Poggei*), it is, in all the European Hesperians, either well developed or entirely absent; in this respect it is a good characteristic, but as a generic character, is only to be taken *cum grano salis*, unless we would separate, without good reason, forms which are naturally associated.

I call that the discoidal stigma which Dr. Herrich-Schaeffer has designated as "schuppenwulst" (a pad of scales), forming a peculiar structure in the disk of the fore wings. The expression employed by Herrich-Schaeffer would give a quite false idea of the nature of this structure. The deep black streak of which it consists wholly or in part, is neither a puffy elevation nor formed of scales, but is composed of a dense felt-like substance of very fine, short, stiff and bristly fibres, as may be seen by placing scrapings of it beneath the microscope. In its simplest form (*Thymelicus lineola*) it is nothing but a slender black streak, the surrounding part of the wing presenting no alteration in its normal scaly covering. In case of increased extension of the streak, however, the change affects also the surrounding area. The scales of the wing that encircle it are raised and undergo various alterations, some of them assuming the form of the antenna of a Diurnal butterfly. Still greater changes take place in the structure of the whole area in the midst of which this streak is placed in some American species (*Pamphila Huron* Edw.).

Less diversity appears in the situation and direction of the black streak. It generally starts from the dorsal-vein,* either at the end of the first third of its length, or a little before that point; then it runs across the first branch of the median-vein, where it is frequently contracted or sometimes interrupted by raised scales, advancing in an oblique course upward and outward to the origin of the second and third branches of the median at the lower corner of the middle cell. Among the species known to me, there occurs only in *Pamphila mathias* F., an essential deviation in the situation and direction of the stigma.

While the stigma furnishes good specific characters, it is of no generic value, since in nearly related species it is at one time present and at another absent. What appears to be of greater importance is the presence or absence of a hair-tuft on the posterior tibiae. Of the Hesperidae here

* [Generally known to American Entomologists as the submedian vein.—L.]

referred to, only two genera possess it, *Catodaulis* and *Scelothrix*, and for which latter, in addition to the sheath-formed appendages of the metasternum, it forms the most important separative character from the nearest related genus, *Pyrgus* (which see).

A more or less deep and extensive excavation on the side of the first abdominal segments (bauchgrube = abdominal cavity) may be observed in the males of a great many genera of Hesperidae, although not always easy to be recognized, as it is generally covered by long hair, which is either spread smoothly or matted in confusion. It is most fully developed in those genera whose males are provided with a costal-fold, particularly in *Scelothrix*, where the upper half of the abdomen appears as if eaten out. What seems most surprising is the apparent absence of it in some males belonging to species which show it very distinctly. These specimens being quite fresh and fully scaled, it is but natural to suspect that the cavity is first found or becomes visible after coition and the evacuation of the contents of their testicles. Nevertheless, the cavity actually exists in other specimens that are in equally good condition, and exhibit it as distinctly as the worn ones. A male of the American *Eudamus Tityrus* F., which I impaled immediately after its exclusion from the pupa, shows the cavity remarkably well developed. So there remains an enigma to be solved by further research, and especially by the examination of fresh specimens. The cavity seems, however, of little systematic value, on account of its gradual appearance, which allows no sharp limits to be drawn.

The neururation of the wings has not been examined by me to the extent required, nor with that accuracy which could only be attained by denuding the wings, so as to enable me to decide whether they furnish a more solid foundation for a natural division of the Hesperidae than the parts described above. This, I consider, the principal defect of my work. For he who would undertake to establish a natural system of this group could not possibly avoid performing that task. Neither have I examined the anal appendages of the males, although I do not suppose that the result of such an investigation would pay for the labor which it would involve.

The Hesperian Fauna of the European province (taken in the extent ascribed to it in my *Geographical Distribution of the Lepidoptera*, etc., I., p. 90, and II., p. 298) is by far poorer in species than any other of the six great zoological "Regions" into which, according to Wallace's latest

researches,* the earth is divided—the still little known region of Australia not excepted.

This poverty of species appears the more striking since the area of our Fauna is not only the largest, but also the most thoroughly searched. Although it does not extend to the tropics, that genuine home of the Hesperidae, it is, nevertheless, in this respect not less favorably situated than is North America north of Mexico, yet still falls far behind that country.

Kirby's *Synonymical Catalogue of Diurnal Lepidoptera* (1871) embraces eleven hundred and two species of Hesperians, known either by descriptions or figures. Staudinger's *Catalogue of Lepidoptera of the European*

* See this excellent work : “ *The Geographical Distribution of Animals*, by A. R. Wallace; Authorized German edition by A. B. Meyer, 1876.” I would here call attention to the fact that the boundaries of the first primary region of Mr. Wallace, which he names Palæarctic, almost exactly coincide with those of our European region. The only difference is that Wallace places the boundary farther south—in Africa to the Tropic of Cancer, in Asia to the Himalaya range, and farther eastward into the south of China. But this difference can hardly be considered as such, for, Lepidopterologically, we cannot determine the southern limit of these almost unknown regions, but hypothetically. Moreover, Wallace's boundary lines do not rest upon a very sure basis; Japan and Northern and Central China are overlapping provinces of such mixed animal population that we are almost as well justified in adding them to the northern adjacent (Indian) Faunal-province as to the southern. Thus, then, nearly the same result has been reached in two different ways. Ours, which is only applicable to one order of insects, is based upon a plain comparison of the statistics of the local Faunas known to us, and the principle laid down by Schouw, according to which that part of the earth's surface which is to be established as a natural kingdom must possess at least one-half of its species and one-fourth of its genera as peculiar to itself. Wallace, in his investigations embracing the whole domain of zoology, lays the principal stress on the distribution of the Mammalia, and takes into consideration their present and also their pre-historic condition, as far as the latter may be determined from the fossil remains in former epochs of the earth. Now, if two divisions of the animal kingdom, so widely distinct, both by their organization and means of distribution, as the mammals and butterflies, return essentially the same answer to the zoographer respecting the extent of the region to which our division of the world belongs, this, certainly, may be considered a strong guarantee of the probability that we have made no mistake, but that we have, indeed, found a region which is consistently natural in all its belongings. For the present I retain the old name of European Faunal-region, together with its accustomed boundaries, which will be in conformity with Staudinger's Catalogue. Staudinger, as is well known, annexes thereto Arctic America, and for good reasons, although on no better grounds than our Transatlantic colleagues would have in adding to their Faunal-region the Arctic portion of the Eastern hemisphere.

Fauna, published the same year, includes only forty-six species, including certainly by error the assumed European species, *Hesperia Aetna* Bdv. Meanwhile, to restore due proportion, there should be deducted from the number given by Kirby, the varieties which he admitted as distinct species and those which he mentions under more than one name. The number of such seems to be quite considerable, if I may judge from those known to me, of those which I do not know. Nevertheless, I suppose it will not amount to more than one-tenth of the whole, so that, by accepting the round number one thousand, and placing to account the discoveries of the last six years, this number may perhaps be regarded as too low rather than as too high. Hence the proportion (46 : 1000) of the number of our Hesperians to the total number known, would be about as one to twenty-two. Europe, strictly, has only twenty-eight species, and it is hardly probable that this number will be increased by new additions.

The Fauna of North America claims particular interest because of its many close relationships to ours, and the impossibility of separating its Arctic products from those of the Eastern hemisphere. Edwards' later Catalogue enumerates, as before stated, one hundred and eleven Hesperians as inhabitants of the Extra-tropical parts of North America, including *Sylvanus* and *Tages*, but excluding a number of Scudder's species which Edwards regards as varieties. North America is thus far more than twice as rich in species as our Faunal-region ; but still, in proportion to her vast territory, is poor in comparison with the tropical parts of the earth, and above all if compared with South America, where not only the Hesperian Fauna, but the Diurnals especially, have developed in their greatest abundance.

The genera common to both the American and European Faunas are *Carterocephalus*, *Thymelicus* (from both of these I have as yet seen no American species), *Pamphila*, *Pyrgus*, *Scelothrix* and *Nisoniades* ; the ten other genera adopted by Edwards have no representatives in our Faunal-region. North America is poorer than Europe in species of the genera *Pyrgus* and *Scelothrix*, but as an offset to that, it is far richer in species of *Pamphila* and *Nisoniades*, especially of the former, of which Edwards mentions fifty-eight. The southern portions of the Union are populated by tropical forms, of which certain representatives (*Eudamus Tityrus* Fab. and *E. Pylades* Scudd.) extend to New York and farther north.

(To be Continued in Following Number.)

THE ABBOT SPHINX—*Thyreus Abbotii* Swainson.

BY THE EDITOR.

The subject of this illustration is another of the large grape-feeding insects which is found occasionally on both cultivated and wild vines, as well as on the Virginia Creeper. In fig. 7 we have the full-grown larva

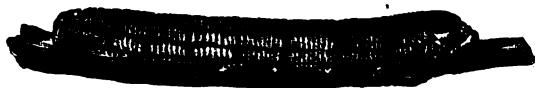


Fig. 7.

figured, as well as the moth. This larva is said to vary considerably in appearance, the ground color ranging between reddish-brown and dirty yellowish.

As we have never met with the larva ourselves, we shall copy Mr. Riley's description of it as it was found by him in Missouri: "I have reared two individuals which came to their growth about the last of July, at which time they were both without a vestige of green. The ground color was dirty yellowish, especially at the sides. Each segment was marked transversely with six or seven slightly impressed fine black lines, and longitudinally with wider non-impressed dark brown patches, alternating with each other and giving the worm a checkered appearance. These patches become more dense along the sub-dorsal region, where they form two irregular dark lines, which on the thoracic segments become single with a similar line between them. There was also a dark stigmatal line, with a lighter shade above it, and a dark stripe running obliquely

downwards from the posterior to the anterior portion of each segment. The belly was yellow with a tinge of pink between the prolegs, and the shiny tubercle at the tail was black with a yellowish ring round the base. The head, which is characteristically marked, is slightly roughened and dark, with a lighter broad band on each side, and a central mark down the middle, which often takes the form of an X."

The chrysalis, which forms in a superficial cell on the ground, is black inclining to brown between the segments.

The moth is of a dull grayish-brown color, with the fore wings somewhat lighter beyond the middle and variegated with dark brown. The hind wings are yellow, becoming paler near the body, with a broad border of a dark brown hue. The margins of both wings are irregularly cut.

This moth has been taken in the vicinity of Hamilton, and we believe also in Amherstburg, Ontario, but we have not heard of its having been captured anywhere else within our Province; but as it is widely distributed, being found in nearly all the Eastern and many of the Western States, it is likely to be yet met with in other localities among ourselves.

ON THE LARVÆ OF *LYC. PSEUDARGIOLUS* AND ATTENDANT ANTS.

BY W. H. EDWARDS, COALBURGH, W. VA.

In ENT., x., p. 80, I stated that Dogwood was found to be the spring food-plant of this species, that is, of the larvæ proceeding from eggs laid by the form *violacea*; but probably there are other plants serving the same purpose, some of which bloom earlier than Dogwood, for fresh examples of the butterfly, form *pseudargiolus*, were taken on 21st April and on several subsequent days, and this was long before any of the larvæ feeding on Dogwood could possibly have produced them. Prof. J. H. Comstock has recently sent me quite a number of mature larvæ taken by him at Ithaca, N. Y., feeding on the flower heads of *Viburnum acerifolium*, and in confinement the larvae will eat Clover, *Nasturtium*, *Begonia*, *Asclepias*, &c., eating the anthers. But I have been unable to make the females lay eggs on Clover in confinement. On the Dogwood, so long

as anthers are to be had, the larvae live on them, but as the flowers mature and fall off, they are forced to eat through and into the hard seed vessel, and I have even seen them boring into the woody stem below. These were belated larvae, and such as when mature produce the variety *neglecta*. The larvae being starved are small, and the resulting butterfly is small. *Neglecta* is flying now, and many examples are very diminutive. The color of the larvae feeding on Dogwood varies much from the color of those which feed on *Cimicifuga racemosa*, few being white in the last stages, but nearly all dull crimson or green, or a mixture of the two. Nevertheless a small percentage of the larvae on *Cimicifuga* are also green or crimson, though most are white. I have not seen ants about the Dogwood, and on introducing them to larvae confined in glasses, they manifested no knowledge of the larvae, and were wholly indifferent to them. And only on rare occasions have I been able to discover the tubes on 11th segment protruded even partially with any of the Dogwood caterpillars kept in the house. When I did see them, they pulsed incessantly, out and in at least once a second. In two instances, after repeated examinations, I chanced to see the tubes fully expanded, but accompanied by this pulsating movement, the withdrawal being more or less complete. No teasing or irritating at any time availed to make them appear, but severe pressure, resulting in the death of the larva, applied to the sides of the 11th segment, did produce them. But even by this pressure I could not discover the organ of 11th segment, nor force any fluid from it. As with the fall food-plant, *Actinomeris squarrosa*, the Dogwood is neither sweet nor juicy, and it may be that the larvae feeding on these plants do not secrete the fluid. Prof. Comstock found it different with the *Viburnum*, and stated that the "tubes on the penultimate segment were seen to evaginate repeatedly at the solicitations of the ants."

From *Cimicifuga* I have collected many eggs and scores of larvae, and day after day I have watched the latter on the stems of the plant. So long as the larvae were small no ants were seen attending, but they have been constantly found with nearly mature larvae. The ants have been of four species, the first scarcely more than $\frac{1}{16}$ inch long, the second $\frac{1}{8}$ inch, the third $\frac{3}{16}$ inch, and the fourth $\frac{1}{4}$ inch, but the specific names I have not yet ascertained. Most often it has been the second of these which attended the larvae, and from two to eight in company, on the same stem, with from one to three or four larvae. The third species is frequently seen, but only from one to three have been seen on the stem. Of

the fourth I have seen but a single ant and in one instance. I have watched and experimented in various ways on both larvae and ants, shifting either from one stem to another, fresh larvae to ants and ants to larvae. The ants, when discovered on a stem, will invariably be on or near the larva. They run over the body, caressing with antennae, plainly with the object of persuading the larva to emit a drop of the fluid on 11. Most of this caressing is done about the anterior segments, and while the ants are so employed, or rather, while they are absent from the last segments, the tubes of 12 are almost certainly expanded to full extent, and so remain, with no retracting or throbbing, until the ants come tumbling along in great excitement, and put either foot or antenna directly on or close by the tubes, when these are instantly withdrawn. The ants pay no heed to the tubes, do not put their mouths to them, or to the openings from which they spring, nor do they manipulate that segment. They seek for nothing and expect nothing from it. But they do at once turn to 11, caress the back of the segment, put their mouths to the opening, and exhibit an eager desire and expectancy. By holding the glass steadily on 11, a movement of the back of this segment will soon be apparent, and suddenly there protrudes a dull green, fleshy, mamilloid organ, from the top of which comes a tiny drop of clear green fluid. This the ants drink greedily, two or three of them perhaps standing about it, and they lick off the last trace of it, stroking the segment meantime. As the drop disappears this organ sinks in at the apex and is so withdrawn. The ants then run about, some seeking other larvæ on the same stem, some with no definite object, but presently all return, and the caressings go on as before. The intervals between the appearance of the globule varied with the condition of the larva. If exhausted by the long continued solicitings, some minutes would elapse, and the tubes meanwhile remained concealed; but a fresh larva required little or no urging, and one globule followed another rapidly, sometimes even without a retracting of the organ. I have counted six emissions in seventy-five seconds. The larva did not always await the approach to the 11th segment, but gave out the drop unsought and as soon as it was aware of the presence of the ant. Now and then the drop was preceded by a bubble several times larger than itself.

As I have stated, the tubes are usually expanded when the ants are absent from the last segments, and are certainly retracted when they come near. I counted the length of these periods of expansion, 10, 20, 50, and

in one case 82 seconds, the period always ending with the approach of the ants.

When I placed a fresh larva, taken from the house, on the stem, as soon as the ants discovered it there was immense excitement among them, and a rush for the last segments. The larva forthwith relieved itself by the excretion of the fluid, and the tubes stood out with domes expanded between the times of secreting. If I placed a fresh larva on a stem on which were no ants, there was no excitement in the larva, no appearance of the tubes and no movement in 11th segment. I have watched repeatedly to make sure of this. But if ants were now transferred to the stem, the moment the caressings began the larva changed its behavior.

From what I have seen, I am led to believe that these tubes are merely signals to the ants, and that when the latter discover them expanded they know that a refecation is ready, and rush to the orifice on the 11th segment. If the tubes serve any other purpose, I have failed to discover it. There is no duct visible on the dome of the tube when largely magnified, and the ants seek nothing of the tube or on the 12th segment. It might be supposed that the tubes are used for intimidation, to frighten away enemies, but they certainly are not. They are in some way connected with the organ in 11, and in the younger stages, when the larvae suffer most from enemies, neither tube nor this organ is available. The outward openings, and the orifice in 11, are visible in the youngest larval stages, but till near maturity the larva has no use of the tubes and cannot emit the secretion. The ants rarely attempt to caress or solicit young larvae, but pass them by with indifference. When I have occasionally seen an ant run about one of these, the larva manifested great annoyance, throwing up the hinder segments to drive away the intruder. The larva plainly considers the ant as a something to be got rid of—as an enemy. If the tubes could now be thrust out the ant would be attracted, not repelled. But the moment that the tubes are free, and the secretion ready to flow, which I believe to be immediately after 4th and last moult, but may perhaps be just after 3rd moult, and is certainly not earlier than that, the larva submits quietly to the attentions of the ants, and invites and rewards them. Dr. Weismann wrote: "You should try and observe what enemies the larvae have. It is conceivable that there are such enemies as are afraid of ants." I find four species of parasites about these larvae. Two are Dipterous. These are of the size of the common house fly. They deposit eggs on the skin of the larva (in an instance observed, on the

back of 2nd and 3rd segments, near the junction, and at the second larval stage), and as the grubs hatch they eat their way into the larva, to emerge when both they and the larva are full grown—of course, destroying the latter. Another is Hymenopterous and minute. Its egg is deposited in the very young larva, probably at first stage. The grub eats out when the larva is half grown, at once spins a silken cocoon, from which in a few days the new parasite comes forth. The destruction of larvae by these, and very likely, other similar parasites, is immense. Of about a dozen mature larvae received from Prof. Comstock, but one reached chrysalis, all the rest giving out one of the Diptera spoken of. If any parasite attacked the mature larva, the grub of the former would live within and destroy the chrysalis, and instead of a butterfly therefrom, the parasite would emerge. Multitudes of chrysalids of other species of butterflies are thus destroyed; but in *pseudargiolus* there appears to be a singular immunity from enemies at this stage. I have never yet seen a parasite emerge from a chrysalis. Why this species, and doubtless many other *Lycaenæ*, are thus favored will perhaps in some degree appear from a little incident to be related. On 20th June, in the woods, I saw a mature larva on its food-plant, and on its back, facing towards the tail of the larva, stood motionless one of the larger ants (designated above as the third in size). At less than two inches behind the larva, on the stem, was a large ichneumon fly, watching its chance to thrust its ovipositor into the larva. I bent down the stem and held it horizontally before me, without alarming either of the parties. The fly crawled a little nearer and rested, and again nearer, the ant making no sign. At length, after several advances, the fly turned its abdomen under and forward, thrust out its ovipositor, and strained itself to the utmost to reach its prey. The sting was just about to touch the extreme end of the larva, when the ant made a dash at the fly, which flew away, and so long as I watched—at least five minutes—did not return. The larva had been quiet all this time, its tubes out of sight and head buried in a flower bud, but the moment the ant rushed and the fly fled, it seemed to become aware of the danger, and thrashed about the end of its body repeatedly in great alarm. But the tubes were not protruded, as I was clearly able to see with my lens. The ant saved the larva, and it is probable that ichneumons would in no case get an opportunity to sting so long as such vigilant guards were about. It strikes me that the larvae know their protectors, and are able and willing to reward them. The advantage is mutual and the association is friendly always.

There is no compelling by rough means on the one part and no reluctant yielding on the other. The demonstrations made by the ants are of the most gentle nature, caressing, entreating, and as the little creatures drink in the sweet fluid, lifting their heads to prolong the swallowing with manifest satisfaction and delectation, then lick away the last trace, caressing the back of the segment with their antennae as they do so, as if to coax for a little more, it is amusing to see.

The tubes in this species are white, cylindrical, of nearly even size, rounded at the top, and studded there with little tuberculations from which rise the tentacles. These last are tapering, armed with little spurs disposed in whorls, and stand out straight, making a white hemispherical dome over the cylinder, and none of them fall below the plane of the base of the dome. Nor do they ever hang limp or lie across the dome, as described by Gueneé in *L. betica*. When the tube comes up, the rays are seen rising in a close pencil, and as the dome expands they take position. On the contrary, when the tube is withdrawn, the top of the dome sinks first and the rays come together in pencil again. The expanded tube and its dome are beautiful objects to look upon.



Fig. 8.

I desire to express my obligation to Dr. J. Gibbons Hunt, of Philadelphia, for microscopical observations made on these larvae. Aided by him, Miss Peart has been able to make several drawings, some of which I give herewith, showing the expanded tube and one of the rays, and the pencil of rays described.

The same organs are found in larvæ of *L. comyntas*, and their shape is precisely as in *pseudargiolus*.*

I stated on page 80 that all the black individuals of *violacea* taken proved to be males. I find no black female of this species, and presume there is none.

Coalburgh, 15th July, 1878.

* In Newman's British Butterflies, London, 1871, p. 125, I find this sentence quoted from Prof. Zeller: "I could not perceive that these caterpillars (*L. medon*) had a cone capable of being protruded, like that which we find in *L. corydon*, and which the ants are so fond of licking."

INSECTS OF THE NORTHERN PARTS OF BRITISH AMERICA.

COMPILED BY REV. C. J. S. BETHUNE, M. A.

From Kirby's Fauna Boreali-Americana : Insecta.

(Continued from Vol. x., p. 118.)

[275.] VI. HEMIPTERA.

FAMILY PENTATOMIDÆ.

383. *PENTATOMA CARNIFEX* *Fabr.*—Length of body $2\frac{1}{2}$ lines. Several specimens taken in the road from New York to Cumberland-house.

Very near *P. oleracea*, and probably its American representative. Body black, a little bronzed; grossly and thickly punctured, the punctures on the upper surface the deepest. Head subtrapezoidal; promusci pale in the middle; antennæ longer than the head; prothorax wider than long, with the lateral angles obtuse; signed with a sanguine cross, the arms of which extend from angle to angle; lateral margin, as well as that of the hemelytra and abdomen, white; scutellum longer than the thorax, obtuse with a subtriangular sanguine spot on each side near the apex; penultimate ventral segment of the abdomen margined with white; membrane white.

[276.] 384. *PENTATOMA VARIEGATA* *Kirby.*—Length of body 3 lines. A single specimen taken in the road from New York to Cumberland-house.

Upper surface of the body punctured. Head, excluding the prominent eyes, subtrapezoidal, black, with the margin below the eyes, white; promusci extending to the base of the hind legs, pallid, black at the tip; antennæ black; prothorax transverse with lateral angles obtuse; pallid with a tint of flesh-colour, especially at the angles, with a broad anterior and narrow posterior black band, both abbreviated on each side, and the latter almost divided into two; scutellum an isosceles triangle, obtuse at the apex, black with the lateral margin pallid; hemelytra black with a pallid lateral margin, membrane embrowned; underside of the trunk black spotted with pallid and sanguine, punctured; tibiæ and apex of the thighs

black ; base of the thighs sanguine ; abdomen below punctured at the sides, sanguine, with a large black discoidal spot, rather nearer the anus ; nearly divided into two ; on the sides and at the base naked, but a quadrangular space of the inner side of each division is covered with decumbent subcinereous pile.

N. B. The antepectus is entirely pallid, but the socket, if it may be so called, of the legs is redder at the margin than the rest.

385. *PENTATOMA TRILINEATA Kirby*.—Plate vi., fig. 6.—Length of body 3 lines. One specimen taken with the preceding.

[277.] Body underneath and the head black, a little bronzed ; thickly punctured with rather deeply impressed punctures ; antennæ reddish at the base, with the two last elongated and incrassated joints black ; prothorax black anteriorly, posteriorly lurid with the lateral margin and an intermediate longitudinal impunctured line, which extends nearly through the scutellum, white ; the scutellum has also a white linear spot and dot on each side at the base ; the punctures of the thorax, scutellum, and hemelytra are black ; the membrane of the latter is white ; the legs and sides of the breast are lurid spotted or punctured with black ; the elevated basilar portion of the bed of the rostrum is concave and has a semicircular outline, and its margin, viewed under a strong magnifier, is minutely serrulate.

FAMILY EDESSIDÆ.

386. *EDESSA NEBULOSA Kirby*.—Length of body 3-4 lines. Three specimens taken in the journey from New York to Cumberland-house, and in Lat. 65°.

Body pale yellowish, sprinkled with black impressed punctures, most numerous and largest on its upper surface, which is clouded with reddish-brown, or blackish shades ; the antennæ are of a reddish-yellow ; the lateral angles of the prothorax are more acute than in the *Pentatomæ* ; the scutellum is acuminate or attenuated at the apex ; the lateral margin of the abdomen has a black spot on each segment, which sometimes appears on the ventral segments.

VARIETY B. Smaller, with the ventral segments of the abdomen rufescent, and the clouding of the upper surface of the body blacker ; the thorax also is black posteriorly.

FAMILY CAPSIDÆ.

387. *MIRIS PUNCTULATUS Kirby*.—Length of body 3 lines. Two specimens taken in Lat. 65°.

[278.] Body oblong, pale, somewhat lurid with a very slight tint of green. Head triangular, impunctured; eyes a little embrowned, prominent; antennæ as long as the prothorax, subtestaceous with the two last joints and the underside of the first black; thorax, scutellum and hemelytra very minutely punctured; a small portion of the prothorax adjoining the head is separated from the rest by an impressed sinuous line and is not punctured; legs pale; abdomen subpyramidal, black above, pale underneath.

388. *MIRIS VENTRALIS Kirby*.—Length of body 3 lines. Taken with the preceding.

Very similar to *M. punctulatus*, and perhaps only a variety, but the hemelytra are faintly clouded with black, the underside of the abdomen is dusky with two longitudinal reddish spots or stripes.

ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION
FOR THE ADVANCEMENT OF SCIENCE.

The Annual Meeting of the Club will be held at St. Louis, Mo., on Tuesday, the 20th of August, 1878, at 3 o'clock, p. m. All Entomologists who are interested are invited to assist, and will report at the headquarters of the Association at the Lindell Hotel, on the 19th or 20th, where they will be informed of the exact place of meeting. The meetings of the Association will begin on the morning of the 21st of August. Prof. J. K. Rees, at St. Louis, will give information to members about car fares and accommodation.

B. PICKMAN MANN, Secretary.

NOTICE.—In consequence of a series of uncontrollable mishaps, the issue of the present number has been delayed nearly a month beyond its usual time.

CORRESPONDENCE.

ON THE SCARCITY OF PAPILIONIDÆ.

DEAR SIR,—

I have seen very few *Papilionidæ* of any species this season up to date, except *ajax*, which has been abundant as ever. But of *turnus*, usually exceedingly plenty in spring, I have seen scarcely half a dozen examples. No *troilus* and few *philenor*. So *Colias philodice* and all Pierids have been remarkable for their absence. But butterflies from hybernating larvæ, or hybernating imagos, in contrast with those from hybernating chrysalids, have been abundant — Melitæas, Argynids, Vanessans and Satyrids. On 2nd June, 1877, I rode for several miles along a creek not far from where I live, and *Papilios* swarmed. Passing a flat rock by the side of the creek, a space on it, which I computed as not less than four feet square, was studded with *Papilios* as thick as they could stand. When they rose it was like a cloud. Nine-tenths of these were *turnus*. Allowing one square inch to each butterfly, and this is ample, there were upwards of 2,300 butterflies in that mass. And I passed lesser groups with every mile as I rode; so that the total absence of the species this year is remarkable. It would seem possible that the extreme mildness of last winter allowed of the existence or activity of enemies (insect probably) who sought out and destroyed the chrysalids, but why *ajax* should have escaped is beyond my conjecture.

W. H. EDWARDS.

Coalburgh, W. Va., 16th June, 1878.

DEAR SIR,—

Mr. Bates is quite right in saying *Doryphora* will eat *Solanum dulcamara* and *Datura stramonium*; they have preferred these to tomatoes in my garden. A friend found them eating *Hyoscyamus*. The present season seems exceedingly favorable to production of *Nematus* and other grubs destructive of the currants and gooseberries.

H. H. CROFTS, Toronto, Ont.

DEAR SIR,—

A single specimen of the rare Sphinx, *Lepisesia flavofasciata*, was taken here on Lilac blossoms, May 28th.

CHAS. FISH, Old Town, Maine.

The Canadian Entomologist.

VOL. X.

LONDON, ONT., AUGUST, 1878.

No. 8

SOME OBSERVATIONS ON DERMESTES.

BY CAROLINE E. HEUSTIS, ST. JOHN, N. B.

Having read in the Report of the Entomological Society of Ontario for 1877 an article by Prof. J. T. Bell, of London, Ont., entitled "How to Destroy Cabinet Pests," I thought it might not be unprofitable to record my own observations on *Dermestes*.

Early in the summer of 1876 I captured four beetles, three males and one female, and placed them in a glass jar with a piece of the meat on which I found them feeding. I observed the female deposit a number of eggs on the meat, but before any were hatched I left home, and was absent about five weeks. On my return I found a large and flourishing colony of larvæ, most of them full grown.

My object in rearing these insects was not to study their natural history, but to find out the best means to destroy them. I put a piece of camphor gum in the glass as a first experiment. The effect on them was very slight. They appeared a little uneasy at first, but in a minute or so commenced crawling over the camphor quite unconcerned. I had heard of a clothier who rolled tallow candles up in webs of woollen cloth to preserve them from the attacks of "moths," and I resolved to try its effects on *Dermestes* larvæ. With this view I put a small piece of tallow in the glass, and the effect was almost instantaneous. It was quite ludicrous to see the stampede which commenced. Never did insect evince more terror or disgust than did these pests. They fled pell-mell to the side of the jar, but as there was no way of escape, they were obliged to yield to "circumstances over which they had no control." The closest observation failed to detect one going near the tallow. They remained for several days huddled together by the side of the jar in a confused mass.

Satisfied with my experiment, and being very busy at the time, I put the jar away, and on looking at it about a fortnight afterward, I found but one beetle, and that one *dead*, of all that large family. As all the larvæ and three of the four beetles had disappeared and "left no trace behind," I naturally concluded that they had been driven by starvation to prey upon each other. There was no possibility of escape from the jar, and my conclusion seems reasonable, even if I cannot prove it.

I have ever since kept tallow in trunks or presses where there are woolen garments, blankets or furs, and I have had nothing eaten up to the time of writing. In preparing my boxes for mounted specimens, I put bits of tallow between the strips of cork and cover with paper gummed to the sides of the box, and I have not had a single specimen injured by *Dermestes* or any other cabinet pest. As tallow is cheap and can be obtained in either town or country, I would heartily recommend it to both housekeepers and naturalists. To the former it would be much better and less disagreeable than the snuff, tobacco, pepper and other preventives which are put on furs with such unsatisfactory results. Although such a remedy as Prof. Bell recommends might do for the cabinet, it would be neither pleasant nor safe to have about our clothing.

MAMMALS ATTRACTED BY SUGAR.

BY JAMES S. BAILEY, A. M., M. D., ALBANY, N. Y.

It has not been supposed that animal life would be attracted by sugar, but while sugaring for Lepidoptera the contrary has been proven. On a number of occasions we have taken deer mice while in the act of feeding on sugar, and more recently we have taken a flying squirrel while lapping the sweet on a sugared patch.

Not long since, in making our rounds while sugaring, we discovered a skunk endeavoring to taste the sugaring, and so intent was he that our

approach was unobserved until a piece of dead wood was hurled at him, when he reluctantly left. The throwing of a second missile quickened his pace and caused him to distribute his perfumery, which rendered the air rather more fragrant than Lubin's Ext. of new-mown hay. It is unnecessary to state that our recreation for the evening was at an end.

We have frequently taken at sugar tree toads and various species of Coleoptera. A Texan correspondent says it is not uncommon for him to take at sugar Scorpions, and also species of Lizards, which are numerous in that latitude.

TETRAOPES TETROPTHALMUS FORST.

BY W. L. DEVEREAUX, CLYDE, N. Y.

In the early part of June, 1876, while plowing through a patch of *Asclepias cornuti* (the plant upon which beetles of the above genus are found), I observed numerous Cerambycidian larvæ in the bottom of the furrow, stirring about in the soil. Two of the larvæ were put in a glass jar with a growing milk-weed plant. Although they were put in the soil near the roots, they soon came to the surface and wriggled about for a week, and then pupated, and finally came out perfect specimens of *T. tetrophthalmus*.

I have endeavored to find them in or about the roots of the milk-weed since, but have failed to find a trace of any. To judge from the black scars and other appearances of the roots, it seems the larvæ live in the soil and wound the roots with their mandibles, and thereby subsist on the milk or juice which flows so readily at the slightest abrasion.

Recently I saw a larva of *Corymbites cylindriciformis* which had captured an imago of *Harpalus Pennsylvanicus*. It had crushed in one elytron with its mandibles, and still held it firmly, though the beetle was striving hard to get away.

THE GENERA OF THE HESPERIDÆ OF THE EUROPEAN FAUNAL-REGION.

BY DR. A. SPEYER.

(Translated from the Stettiner Entomologische Zeitung for 1878, pp. 167-193.)

(Continued from July No., p. 129.)

Among the North American species known to me in nature, there is not one identical with, or even similar to any European ; and the opinions of prominent Transatlantic colleagues, as to whether identical species occur in the two countries (*Scel. centaureæ* excepted, which is common to the Arctic regions of both continents) are very far divergent. Edwards on the authority of Boisduval cites in his Catalogue, *Sylvanus* and *Tages*, and besides, also, *comma* as American ; while he places *Pamph. Fuba*, *Manitoba*, *Colorado*, *Nevada* and *sylvanoides** (which are regarded as good species by Scudder) as varieties of *comma*. I refrain from expressing any opinion in this question of species, not knowing any of the forms. As to *Sylvanus* and *Tages*, I would prefer to drop them from the list until their right to be classed among the indigines of America shall have been based upon more reliable authority than that of Boisduval. If we may trust Lederer's statements, Boisduval's Californian *Tages* var. *Cervantes*, would appear to be not only a distinct species, but also of a different genus from *Tages* ; for it is said to deviate "not only in coloring, design and in its diaphanous, glassy spots, but also in the cut of the wings and in the posterior legs of the male, which have only apical spurs and a long hair-pencil" (*Wiener Entom. Monatschr.*, 1857, p. 78). Thus there would remain no resemblance whatever to *Tages*, and the carelessness shown in declaring identical two such radically distinct forms, would hardly be expected even from Boisduval, although he is so little scrupulous in such matters. Possibly Lederer's statements may have resulted from a confusion of species.

* In the *Memoirs of the Boston Soc. N. H.*, Vol. II, P. III, No. IV, these species, and also *contma*, are minutely described and well figured, and the anal appendages (which Mr. Scudder estimates as of special value) are explained. He also represents, in the same paper, the times of appearance of the species as different.

The friendly assistance of Messrs. Grentzenberg, Mäeschler and Dr. Staudinger have placed me in a position to bring together, with but a few exceptions, the known Hesperidæ of the European Faunal-region. To the latter gentleman, especially, I am indebted for a knowledge of the Eastern-Asiatic species, so difficult to reach. But four of these have remained inaccessible to me, namely, *Pamphila sylvatica* Brem., *Pyrgus gigas* Brem., (possibly only a var. of *tessellum* H.), *Eudamus guttatus* Brem.-Grey, and *Thanaos popoviana* Nordm. It seemed to me more advisable to leave out these altogether, than to give them a place which their particular investigation might not warrant. In the arrangement I have placed first, those genera which, from the absence of the tibial epiphyses and generally of the middle-spurs of the hind-tibiæ, are closely related to the other *Rhopalocera*; and last, those which carry their wings when at rest in the manner of the moths. I do not, however, intend to assert that these particular features are of paramount importance in a systematic arrangement of the Hesperidæ.

It would be very desirable to divide this large family into convenient groups, but, if it were possible, it would be difficult to find exact distinctive characters for them. Mr. Scudder has made an attempt in this direction. He believes that he is justified in adopting two large groups corresponding nearly to the Fabrician genera *Thymele* and *Pamphila*, and calls the one HESPERIDES and the other ASTYCI, the latter a name chosen by Hübner for the whole family. To the latter would belong 1 to 4 of the European genera given below, and to the former 5 to 9. The most important character of the Hesperidæ (for the other differences which he adduces are not valid) Mr. Scudder describes in the following words:—"In the male HESPERIDES the posterior extremity of the alimentary canal is protected beneath by a corneous sheath, which extends beyond the centrum or body of the upper pair of abdominal appendages, sometimes nearly to the extremity of the appendages, carrying the vent beyond the centrum; while in the ASTYCI, the extremity of the canal is not protected by any extruded sheath, but opens at the very base of the inferior wall of the centrum." (*The two principal Groups of Urbicolæ*. By S. H. Scudder. *Bull. Buffalo Soc. Nat. Science*, I, 195.)

I have not examined the abdominal appendages of the male Hesperidæ, and therefore, I do not know whether this corneous anal sheath would really supply a generally valid mark of distinction between the two tribes of Mr. Scudder. But even if that be not established,—as I fear it

will not,—there appears to me to be no ground for refusing to those two great groups a certain natural right, at least so far as concerns the Europeo-North American Fauna. A costal-fold occurs only in the males of the one group (although not invariably), and a stigma only in those of the other (but still less constantly). The spines of the tibiae while here a rule, are there a rare exception. There appears, moreover, a difference in the color, in so far that the usual black or dark brown ground-color in the Scudderian *ASTYCI* is very often reduced or quite supplanted by reddish yellow in the *HESPERIDES*. The remarks of Mr. Scudder relative to the early stages of these insects will scarcely be supported by extended observations so as to be fully conclusive.

Of the eggs he states that those of the *HESPERIDES* are always distinctly ribbed in the vertical direction, and almost invariably higher than broad, whilst on the other hand, those of the *ASTYCI* are broader than high, smooth and pretty regularly hemispherical. "The caterpillars of the *HESPERIDES* feed usually on leguminous plants [but this is not true of the European ones] and dwell in horizontal leaf-cases; while the *ASTYCI* feed on grasses [but not all] and build vertical cases between the blades."

In the nomenclature of the genera I have followed Herrich-Schæffer's *Prodromus*, without being able (because of the insufficiency of my literary material) to guarantee their unexceptional authority.

I now present, first, a Systematic Synopsis of the species of the European-region which I have investigated; then an Analytical Table of the genera, and lastly will follow the more precise description of their generic characteristics.

HESPERIDES Latr.

1. CYCLOPIDES H. (p.)

1. Morpheus (Pap. m.) Pall. *Steropes* WV.*
- *2. Ornatus Brem.

2. CARTEROCEPHALUS Led.

1. Palæmon (Pap. p.) Pall. = *Paniscus* F.
2. Silvius (Pap. s.) Knoch.

[* This Synopsis is copied *literatim*, except that the original is without the digram æ.—L.]

*3. *Argyrostigma* (Steropes a.) Ev.

3. THYMELICUS H. (p.)

1. *Lineola* (Pap. l.) O.
2. *Thaumas* (Pap. th.) Hufn. *Linea* WV.
- *3. *Hyrax* (Hesp. h.) Led.
4. *Actæon* (Pap. acteon) Rott.

A 4. PAMPHILA F. (p.)

1. *Comma* (Pap. c.) L.
2. *Sylvanus* (Pap. s.) Esp.
- *3. *Ochracea* Brem.

(Ætna Bdv. spec. Americana ?)

B (Goniloba HS.).

*4. *Alcides* (Hesp. a.) HS.

C (Goniloba HS.).

- *5. *Mathias* (Hesp. m.) Fabr.† = *Thrax* Led. non Lin.
- *6. *Zelleri* (Hesp. z.) Led.
7. *Nostrodamus* (Hesp. n.) F. *Pumilio* O.

D.

*8. *Inachus* (Pyrgus i.) Mén.

5. CATODAUUS n. gen.†

*1. *Tethys* (Pyrgus t.) Mén.

6. PYRGUS H. (p.)

A. a. (*Carcharodus* H. *Spilothyrus* Bdv.).

1. *Lavateræ* (Pap. lavatheræ) Esp.
2. *Althææ* (Pap. althææ) H.

Var. b. *Bæticus* (Spil. b.) Ramb. = *Floccifera* Zell.

3. *Alceæ* (Pap. a.) Esp. = *Malvarum* O.

A. b.

4. *Proto* (Pap. p.) Esp.

† The name, which has also been accepted by Kirby, rests upon the authority of Felder: "H. *Thrax* Lin., Don. (haud Led. Verhandl. Zool.-Botan., Ver. 1855, p. 194, taf. 1, f. 9, 10, which is H. *Matthias* Fabr., in tota India vulgaris)." *Wien. Entom. Monatschr.* 1862, p. 183.

‡ *Kato subtus*, *daulos hirtus*.

5. Tessellum (Pap. t.) H.
*Var. b. Nomas (Hesp. n.) Led.
 6. Cribrellum (Hesp. c.) Ev.
B. a.
 - *7. Poggei (Hesp. p.) Led.
B. b.
 8. Phlonidis (Hesp. phl.) HS.
 9. Sao (Pap. s.) H. = *Sertorius* O.
 10. Orbifer (Pap. o.) H.
7. SCELOTHRIX Ramb.
- *1. Maculata (Syricht. maculatus) Brem. et Grey.
 2. Sidæ (Pap. s.) Esp.
 3. Cynaræ (Hesp. c.) Ramb.
 4. Carthami (Pap. c.) H.
 5. Alveus (Pap. a.) H.
Var. b. Fritillum (Pap. fr.) H.
Var. c. ? Cirsii (Hesp. c.) Ramb.
Var. d. ? Carlinæ (Hesp. c.) Ramb.
 6. Serratulæ (Hesp. s.) Ramb. HS. *An præced var. ?*
Var. b. Cæca (Hesp. cæcus) Fr.
 7. Cacaliæ (Hesp. c.) Ramb. HS.
 8. Andromedæ (Syrichth. a.) Wallengr.
 9. Centaureæ (Hesp. c.) Ramb.
 10. Malvæ (Pap. m.) L. = *Alveolus* H.
Ab Taras (Hesp. t.) Meig.
*Var. b. Melotis (Hesp. m.) Dup. = *Hypoleucus* Led.
8. NISONIADES H. (p.)
- *1. Montanus (Pyrgus m.) Brem.
 2. Tages (Pap. t.) L.
9. THANAOS Bdv. (p.)
1. Marloyi Bdv. -- *Sericea* Fr.

Those which occur only in Asia are marked with a star (*). I deem it unnecessary to give more special localities and citations, since both are to be found in Staudinger's Catalogue.

Diagnostic Table of the Genera.

- A. Anterior tibiæ without the appendage (Hind tibiæ, as a rule, with only one pair of spurs).
- a. Antennæ less than half the length of the front-margin of the fore wings. Apical joint of the palpi thick, blunt, conical. Body very slender. 1. CYCLOPIDES.
 - b. Antennæ half as long as the fore wings; apical joint of the palpi slender, conical, rather acute, clothed all around with hairs from the middle-joint to the end. Body stouter. 2. CARTEROCEPHALUS.
- B. Anterior tibiæ with appendage, hind tibiæ with two pairs of spurs.
- a. Antennal club ovate or elongate, without a hook or acute point at the end.
 - α. Apical joint of the palpi slender, subulate, erect. . . . 3. THYMELICUS.
 - β. Apical joint of the palpi short, conical.
 - ο. Hind-tibiæ of the ♂ without a pencil of hairs.
 - χ. Fringe unicolored, club of antennæ curved, ♂ without costal-fold. 9. THANAOS.
 - xx. Fringe checkered. 6. PYRGUS A. & B. b.
 - οο. ♂ with costal-fold, and tuft on the tibiæ. . . . 7. SCELOTHRIX.
 - b. Club of antennæ lunate-falcate; ♂ with costal-fold, and without the tuft on the tibiæ. 8. NISONIADES.
 - c. Club of antennæ slender, fusiform, at about two-thirds of its length bent at right angles; ♂ without costal-fold, but with tibial tuft. 5. CATODAULIS.
 - d. Club of antennæ ovate or oblong, with a little hook or point at the end. Either with costal-fold or with tibial tuft. 4. PAMPHILA A, C and D.
 - e. Club of antennæ oblong, the apical fifth slender and somewhat bent up, and rounded at tip. The rest as in d. 4 PAMPHILA B.
 - f. Club of antennæ bent behind the middle, thence narrowed to the tip. All the rest as in PYRGUS B. . . 6. PYRGUS B. a.

CYCLOPIDES—CARTEROCEPHALUS.

The exotic species unknown to me should answer the question, whether the separation of these two genera could be directly sustained. Lederer has separated *Carterocephalus* particularly on the ground of the absence of the middle-spurs; but this difference is not decisive. *Cyclopides ornatus* has only apical spurs, whilst in other respects it is close to *Morpheus*. The different habitus and the striking differences in the palpi, etc., have determined me to accept the separation provisionally.

If the genera should be united (*Cyclopides*), there will be besides the want of the tibial-epiphysis (which separates them from all the other Hesperians known to me), the following characters common to them: Club of antennæ elongate oval, terminating conically, slightly curved. Apical joint of the palpi conical, projecting almost horizontal. Tibiæ armed with spines, at least the middle ones. Abdomen longer than the head and thorax united, the posterior wings uplifted. Male without the costal-fold, the stigma, and the tuft on the tibiæ.

CYCLOPIDES. Antennæ short, the club of smaller size. End-joint of the palpi thick, bluntly conical, rather free. Body slight, with short thorax, and very long, slender abdomen; the latter somewhat compressed and only sparingly pilose. Wings comparatively large, not remarkably hairy; the hairs along the inner margin of the slightly developed, abdominal suture of the upper surface of the hind wings can only be recognized by very close examination. Hind tibiæ with two pairs of spurs (*Morpheus*), or with only one pair (*ornatus*).

Of *ornatus* I have been able to examine only one specimen (from the Amur, Staudinger), which appears to me, because of the slender abdomen, to be a male; but I cannot be quite sure of the sex. It was much narrower-winged than the male *Morpheus*, and in this respect agreed better with the female of the European species.

This genus appears not to be represented in North America.

CARTEROCEPHALUS. Antennæ equal to half the length of the fore wings, with elongate-ovoid club. Apical joint of the palpi slender, conical, moderately acute, quite concealed by the long hairs of the middle joint. Body moderately robust, with thickly haired (in *argyrostigma* also very long haired) abdomen. Surface of the wings more hairy, with notably a conspicuous streak of still longer and thicker, prominent hairs along the inner margin of the abdominal suture of the hind wings.

Here belong, according to Edwards, two North American species, *Mandan* Edw. and *Omaha* Edw., which last was separated by Scudder (*System. Rev. of Amer. Butterflies*, p. 54) from *Mandan* into a genus, *Potanthus*.

THYMELICUS.

Antennæ half as long as the fore-wings, with elongate-ovoid, conically-tipped club. Apical joint of the palpi nearly erect, moderately long and slender, subulate, hidden to beyond its middle by the long, stiff hairy clothing of the middle-joint. Middle tibiæ with a longitudinal series of short spines. Hind-wings somewhat produced at the inner angle. Male with a discoidal stigma, without a costal-fold, and without a tibial tuft.

It differs from the next related genus *Pamphila* in the slender, subulate apical joint of the palpi and in the absence of the hooklet on the end of the antennal club (*Pamph. Alcides*, in which the antennal hooklet is curved, has a very short, thick, conical apical joint to the palpi).

Edwards places here two North American species which are unknown to me—*Hylax* Edw. and *Garita* Reak.* The Texan species, *Waco* Edw., placed by Scudder in *Thymelicus* must, because of essential differences, form a separate genus, *Copaodes*,† to which, according to Edwards, *Arene* Edw. also belongs.

PAMPHILA.

Club of antennæ ovate, or elongated, on the end more or less curved into a much thinner, acute hooklet, which may be shorter or longer, but always shorter than the club itself. The length of the hooklet depends upon the number of the antennal joints of which it consists (in the American *Phylæus* Dr. it is represented by the single terminal joint which sets upon the thick end of the club in the form of a short spine). Palpi placed close to the front, at most extending a little beyond the eyes, the middle-joint broad anteriorly, closely set with long, brush-like hair-scales; the apical joint conical, either short and thick, or moderately long and more slender, yet not so thin and subulate as in *Thymelicus*. Tibiæ

[* Dr. Speyer has subsequently received these two species from Mr. von Meske, and finds them to be true *Thymelicus*.—L.]

† *Copaodes*—Oar-shaped, having reference to the form of the hairs of the little curl at the base of the antennæ.

unarmed in some species, but with spines in most, which are the stronger upon the middle tibiae. Body robust, the abdomen as long as the head and thorax united. Wings relatively small, stiff, the anterior ones triangular, the posterior ones short, mostly produced at the inner angle, particularly in the male. The anterior wings generally have a stigma, but no costal fold; and the tuft is absent from the tibiae.

- A. Club of antennae thick, with a sharp apical hooklet. Vein 2 (i. e., the first branch of the median) of the fore-wings originates much nearer to the base than to the hind margin of the wings, and is almost twice as long as is the trunk of the median vein to its end. Stigma of the male fore-wings in its normal position, or absent (in the European species it is present).
- B. The last fifth of the elongated club of the antennae slender and bent backward, but rounded out at the end. Second vein as in A. Male without the stigma.
- C. Antennae as in A. Vein 2 originates at, or a little before, the middle of the wing, and is not, or only a little, longer than the trunk of the median. Stigma absent, or when present directed more towards the outer margin and reaching only to the first vein.
- D. Club of the antennae more slender and more fusiform, with acute but less sharply defined apical hooklet. The second vein starts in the middle of the wing. Fringe light-colored; at the end of the veins spotted with dark color (in A B and C not spotted). Male without the stigma.

Our two common Central European species (Div. A) are typical of this great world-wide genus, with which agree, in all essential characters, such as structure of the antennae, neurulation of the wings, etc., the greater number (21) of the North American species known to me in nature. The genus is far too comprehensive and varied to be left without analysis, but this desideratum must await a general classification. In the length of the antennae, the form of the club and its apical hooklet, in the spines of the tibiae, cut of wings, in the presence or absence of the stigma, and in its structure, manifold differences are displayed; these, however, admit of no arrangement into natural groups, if one would avoid shattering the genus in an unwarrantable manner. The greater number of the species which have studied (including the American) have spines on the tibiae—in

some on all the tibiae, in others on the middle and posterior ones, or on the middle tibiae alone. Not less are there all degrees of transition apparent, from the feeblest and least perceptible, to those with the long and stout spines. In order to understand that no natural division can be based upon such differences as these, one needs only to place those without the spined tibiae in comparison with the others. The same value must be placed upon the stigma of the fore wings of the male; it is present in the greater number of the species, at least in the typical (Div. A), but even in a few of these it is wanting, which in other respects do not differ. Perhaps the neuration of the wings supplies better points of support for the division of those species here united into natural genera. The different origin of the first branch of the median vein of the fore wings does not offer available characters because it does not yield sharp limitations. While in some species (*Mathias*, *Zelleri*, *Inachus*) the trunk and first branch of this vein have the same length, the point of departure of the latter in others (*Nostradamus*, *Osyka* Edw.) is nearer the base, and thus forms a transition to the normal form in about one-third of the length of the wings. Whether the origin of the discoidal vein of the fore wings yields a sufficient characteristic for a true genus *Pamphila*, as Felder supposes (*Wien. Ent. Monatschr.* 1862, p. 483), I have not ascertained.

Scudder (*Syst. Revis. of American Butterflies*) has separated the here included species into numerous genera, but unfortunately has not supplied diagnoses; and from the list of the species alone, the grounds for this separation do not become clearly evident.

The single species of Division B, *Alcides* HS., deviates from all the others here united, in the rounded tip of the antennae, and should therefore, strictly speaking, be separated, since the acute tip of the apical hooklet of the club is an essential character of the genus. Besides that, it has another peculiarity. According to Herrich-Schäffer's statement (*System. Bearb. d. Schmett. v. Eur.*, vi, 38), the male of this species has only 2 spurs on the hind tibiae (♀ 4, as usual). Lederer (*Wien. Ent. Monatschr.*, 1857, 79) remarks concerning it: "In the male in my collection (with the female, probably the originals of Herrich-Schäffer's descriptions and figures) I observe distinctly only 3 spurs, the fourth may have been broken off." I have examined 3 males and 1 female. Two flown males (*Amasia*, Staudgr.) have only end spurs, but of the middle spurs not a vestige is to be seen; in the third male (*Magnesia*, Led., from Moeschler's collection) both middle spurs are present, but unusually

short. The female belonging to this male has lost one of its hind legs, and on the other there is a single middle spur—the outer one. Among four or five males only one has four spurs, one three, and two or three only apical spurs. *Alcides* must also be distinguished by a very unusual tendency to lose the middle spurs, or to vary in the number of the spurs, as does *Acidalia rusticata*, the latter of which is the more probable.

In Division C., only the male of *Mathias* has a discoidal stigma—a straight oblique streak, which separates *Mathias* directly from all other species similarly marked. The streak arises nearer the margin than usual, a little behind the middle of the dorsal vein, and ends at the first branch of the median. Its color is also different; it is not coal-black, as others, but whitish-gray and glossy. From the two other species of this Division, *Zelleri* offers no particular difference; *Nostradamus* differs in its unusually short antennae (in this agreeing with the otherwise quite unlike American *Phyleus* Dr.), with their thicker oval club, on which is placed a short conical hooklet, as a point on the thin apical joint.

Herrich-Schaeffer places the species of the Divisions B and C in his genus *Goniloba*; but he is unable to give the difference between it and *Pamphila*.

Inachus has a more slender club than the other species, and is besides separated from them by its spotted fringe (which induced Ménétries to refer it to the genus *Pyrgus*); it has also a peculiarly colored and marked under side of the hind wings. Its place in *Pamphila*, with many other species, can be only provisional.

(To be Concluded in Following Number.)

PAPILIO CRESPHONTES CRAM.

BY JACOB BOLL, DALLAS, TEXAS.

The caterpillar of this beautiful butterfly is living here on *Xanthoxylum carolinianum*, or Prickly Ash; at least, till now I did not find it on any other plants. It can be found three times in a year, first in April and May, then in July, and again in September and October. If the cater-

pillars be touched, they stretch forth the reddish-brown fleshy fork from the neck, like all those of the genus *Papilio*. When they do not eat they are sitting rigid regularly on the surface of the leaves. It is most interesting that in this situation their appearance resembles very much the excrements of birds, on account of their color, consisting of white, gray and brown spots. This resemblance is considerably increased in the earlier stage of the larvae, which are particularly found on open places, and are thus very easily seen.

I saw these larvae for the first time in the early stage, and they deluded me in such a manner that I thought them at first to be excrements of birds fallen upon the leaves, and after further examination recognized them as larvae. This resemblance protects them naturally against their enemies, especially the birds. This likeness of the larvae to excrements of birds may seem strange to some readers, but the means and the ways of nature, whereby many insects are protected against the assaults of their enemies, are very numerous and wonderful.

The pupae of the fall brood sometimes develop in autumn when the weather is favorable, but generally not before April of the next year. As a rare occurrence, it should be mentioned that one pupa of the fall brood of 1875 was not hatched before April, 1877. This observation is very peculiar in this southern latitude, and so far as I know, has never been noticed in butterflies. Among Bombycidae this happens occasionally, and it occurred to me in the old country that pupae of the European *Saturnia carpini* hybernated twice before they were developed.

ON MERMIS, A PARASITE OF THE LARVA OF CARPOCAPSA POMONELLA.

BY DR. H. HAGEN, CAMBRIDGE, MASS.

The interesting paper by Mr. J. A. Lintner, Entom. Contributions, No. iv., induces me to give some extracts from the papers by Prof. von Siebold, which the author could not compare himself, the more as they answer some important questions.

Stett. Ent. Zeit., 1850, p. 335 :

"*Carpocapsa pomonana* W. V.

"I examined with much interest, in the Museum in Breslau, Prussia, the specimens of hair worms communicated by different persons. Those worms were found living in the heart of the apple some years ago, very frequently in Silesia (by F. S. Leuckart, Zoolog. Bruchstuecke, Heft I., 1820, p. 5). Four of them belong to *Mermis acuminata*, and others also to *Mermis*; also a specimen in Prof. Otto's collection. The *Filaria* found in an apple by Prof. Waga will probably also be a *Mermis* (Revue Zool., 1844, p. 366)."

As I have given attention to all I found published about Helminthes in insects, I remembered to have seen some other facts stated about their presence in apples. But in comparing my notes I cannot find the work, and the most thorough research in old and new books was without success. So, till now, the above given quotations from Prof. von Siebold are the only ascertained ones.

Stett. Ent. Zeit., 1854, p. 106 :

"I saw in some letters sent to me that it seemed to be inconceivable to several Entomologists to understand how those worms can immigrate into larvae, which from the beginning of their existence live in buds or in fruits, and which never leave these trees or shrubs on which the eggs were laid. Though we have no direct observations how the *Mermis* immigrates into the caterpillar living in the apple or in the pear, I do not at all think that we are obliged to accept a spontaneous generation. We know very well that a number of lower animals leave the egg very far from the place where they shall live, and that they are obliged to make comparatively long journeys to reach the place destined for them. For instance, the Cicada, the larva of which is obliged to go into the earth, though the eggs are laid on high trees. Why should not the brood of *Mermis* generated in the earth migrate in the opposite way on flowers and trees to reach their proper abode? In the spring at certain times the whole superficies of plants is humid and preserves the worms from drying up. This supposition is corroborated by the observation of Prof. Creplin concerning the migration of another worm."

In a later paper, *l. c.* p. 32, it is stated by direct observation in England and Germany that after strong rains the brood of *Mermis* comes out of the earth and travels on flowers and shrubs in such numbers that the

old tale of "a worm-rain" could have been believed. All those worms belonged to *Mermis nigrescens*. Siebold has seen the immigration (boring into) of young *Mermis* into the larvae of *Hyponomeuta cognatella*, and Dr. Meissner into the legs of larvae of *Ephemera*. The "boring into" is done by an armature on the head of the *Mermis* consisting of twelve movable hooks placed in a double series around, and serving later as a means of locomotion into the interior of the body of the host.

It should be remembered that the *Mermis* leaves the host later to go into the earth, and that only there the sexual parts are developed and the brood generated.

The species was first described by Rudolphi as *Filaria acuminata*, and later by Siebold as *Mermis acuminata*.

A NEW SPECIES OF PHIGALIA.

BY G. H. FRENCH, CARBONDALE, ILL.

Phigalia cinctaria, n. sp.

Wingless female.—Length .75 of an inch; exserted oviduct, .25 more. Color light gray with a very slight olive tint, and irregularly mottled all over with black; the spots large above, but smaller on the sides and beneath; the thorax nearly uniform black; the divisions between the segments pea green while alive, but turning darker in drying. Head grayish black, the clypeus black; antennae black, annulated with gray, reaching to about the middle of the body, when turned back. Hind wings reaching to the back part of the first abdominal segment, the fore wings reaching to the middle of the same segment. Feet and legs grayish black, annulated with gray. The oviduct with two joints exserted, the last third of the outer joint hairy, the hairs perpendicular to the joint. Head short, scarcely to be seen from above, rather wide between the eyes; palpi short. From a single ♀.

Chrysalis.—Length, exclusive of bristles, .55 of an inch. Dark brown, coarsely punctured, the punctures between the segments fine, the abdomen ending in a conical segment, which is smooth at the end and tipped with two short, stout, divergent bristles. Subterranean.

The moth from which the above description is taken was bred from a larva taken from an apple tree about fifty miles north of here, May 28th, 1877. It was at that time an inch long, gray, banded transversely with a number of white lines. It moulted June 6th, when all but one of the white lines were replaced by brown, the ground color remaining the same. After feeding a few days longer, it entered the ground and transformed to a chrysalis as above. At this time it was about an inch and a half long. The imago appeared March 27th, 1878.

ON THE EMERGENCE OF LEPIDOPTERA FROM THEIR COCOONS.

BY C. E. WORTHINGTON, IRVING PARK, ILL.

In the years 1856 and 1857 Capt. Thos. Hutton communicated to the London Entomological Society (Trans. v., 85) and to the Journal of the Agri-horticultural Society of India (ix., 167-9) certain observations on the means employed by the imago of *Actias selene* in obtaining exit from its cocoon. In 1857 Messrs Horsfield and Moore in their catalogue of the Lepidoptera in the Indian Museum, quote and endorse Capt. Hutton's observations, and in the course of their remarks indicate indirectly that the same methods are employed by *Antherea paphia*, an Indian Attacian allied to our *T. polyphemus*.

In these articles the hooks on the wings and the drop of acrid liquid on the head are both noticed and the conclusion arrived at that the means employed are both chemical and mechanical. Capt. Hutton, however, states that the moth discharges this liquid from the mouth and applies it with the brush on the forehead—apparently an error, as the structure of the mouth parts would hardly admit of the secretion of such a liquid, and when secreted it could hardly be conveyed to the forehead.

On reading these notes it occurred to me that I had noticed that examples of *polyphemus* emerging from cocoons from which the top had been removed invariably carried a drop of brown liquid on the frontal tuft, and a little investigation convinced me that the liquid, so far from being secreted by the mouth, was contained in a cell underlying the conspicuous greenish spot on the pupa. This cell is ruptured from the top

by the emerging insect and leaves its contents on the forehead. Pupae in which fully formed moths had died without emerging show, on dissection, the empty cell with a sediment adhering to the forehead of the insect not only in *T. polyphemus*, but in *A. yama-mai* and other species of *Antherea*. I have been able to examine in this condition.

With a view of determining the question, I prepared a number of *polyphemus* cocoons by removing the outer layers and cutting a narrow slit on opposite sides to near the head, so that when suspended in the light the motions might be watched, and in two instances have been able to see, though rather imperfectly, the whole performance. As before stated, the moth on breaking the pupa-skin carries on its forehead a drop of liquid, which, as the moth lengthens itself in the effort to free the fore legs, is smeared upon the end of the cocoon, and during the twisting and squirming accompanying this effort, well rubbed in. After freeing the legs the moth rests for a moment; then, pushing up one shoulder, turns several times in the cocoon, the shoulder being pressed against the smeared part. The result of this appears to be to loosen some of the fibres, for after two or three repetitions of this movement, the legs are extended upward and the abdomen extended, forcing the shoulders more firmly against the cocoon and a vigorous clawing begun; this is succeeded by a butting movement, the abdominal segments being first retracted and then forcibly extended, followed by more twisting, clawing and butting, until a small hole is made, when the butting movements predominate and the moth finally emerges, pushing the cut ends of the threads outward.

So far as I have been able to observe, the hooks in the wings merely serve to detach the fibres and hold them in place until broken by the powerful legs, the removal of the gum and weakening of the silk by the liquid on the head rendering this comparatively easy—this possibly being aided by the surplus fluids of the pupa being brought up during the retraction and extension I have called "butting," but whether this is really the case or not I am unable to state. A similar cell is observable in all pupae of this family, and it seems probable that they all emerge in the same manner, employing neither wholly chemical nor mechanical means, but both.

NOTE.—It is but fair to add that since these notes were prepared I have seen mention of a paper by Mr. Packard on the same subject, but as it is not in general circulation, have been unable to see the paper in question.

CORRESPONDENCE.

ON THE HONEY TUBES OF SOME BUTTERFLY LARVÆ.

DEAR SIR,—

In my paper in the July No. of the CAN. ENT., p. 136, I stated that I found a reference in "Newman's British Butterflies" to a mention by Zeller of the ants licking a conical tube in *Damon* (I think it was).

Zeller refers to C. E. Pezold in L. G. Scriba, *Beitraege zu der Insecten Geschichte*, 1793, Heft 3, p. 230, who states that ants often indicate the presence of the caterpillar of *Papilio Biton* = *Lycæna Damon*. "On the 11th (12th counting the head as 1st) segment are two small yellow spots. I saw a caterpillar moving them while feeding, and with the microscope I found them to be two whitish tubes protruded by the caterpillar and again invaginated. When first protruded the tube is similar to a three-cornered pyramid, the three sides of which can be opened and invaginated in the cylinder. When the caterpillar feeds, the tubes are almost incessantly thrust out and withdrawn. I never saw any fluid coming out, nor remarked any smell. I found two similar wart-like parts on the next preceding segment, but without any change of shape. The caterpillars of *Lyc. argus* and *Thecla Rubi* possess the same movable tubes in the same place, but I could not find them in *Theclas Quercus* and *Betula*. It is a question what is the use of these organs. Are they for defence as in *P. quædaon*? I do not know whether the tubes of *Damon* are excretive organs, but I have some reason to believe they are—the more so as the ants are very busy about the caterpillars and cover them often entirely without harming them. Mr. Esper has observed the same in the caterpillars of *Lyc. Icarus*. Perhaps it is here as with Aphides, where the ants sip up the secretion. That I did not see any fluid is no reason that it does not exist."

W. H. EDWARDS, Coalburgh, W. Va.

DEAR SIR,—

I should be glad to exchange a large number of British butterflies and moths in return for good typical specimens of Canadian Lepidoptera or pupae. Address—

A. J. SPILLER, Mangotsfield, Bristol, England.

The Canadian Entomologist.

VOL. X. LONDON, ONT., SEPTEMBER, 1878. [No. 9

ON THE NEW CARPET BUG.

BY DR. H. HAGEN, CAMBRIDGE, MASS.

Perhaps a few additions to Mr. J. A. Lintner's very interesting article will not be out of place. In 1872 the late Mrs. W. P. L. Garrison came to visit the Museum, and told me about an insect destroying the carpets in Buffalo, N. Y., and named there "the Buffalo pest." I had not then heard anything about the insect, and Mrs. Garrison, after her departure, was kind enough to send me some living specimens from Buffalo. I bred them here in the Museum, and determined them as *Anthrenus scrophularie* L. The following years I had numerous inquiries from Cambridge and Boston in relation to this carpet pest, and I traced about three-fourths of all cases to a large carpet store in Washington St. in Boston, where the carpets were bought, and what ought not to have been done, they were directly laid in the rooms, without beating them before strongly and disinfecting them in some way.

Mr. Lintner was unable to find any record of its preying upon carpets or other woollens in the Old World. But there exists enough in the literature. Dr. H. Noerdlinger, in his well-known book, "Die kleinen Feinde der Landwirthschaft," etc., 1855, 8to., p. 90, states as follows:

"The common flower-beetle, *Anthrenus scrophularie*, is from April common on many flowers, especially on fruit trees and roses. It is common also in houses, etc., where it can become very obnoxious by the destruction of furs, clothes, animal collections, and even leather and dried plants. The obnoxious larva, which naturalists should take care to avoid, is common in closets and rooms in the attic, where it finds dead flies and from whence it likes to enter the other rooms."

I have taken Noerdlinger's book at random, but it would not be diffi-

cult to find such notices in similar books. To show that this pest is not a new one, I add two older authors taken at random.

F. W. Herbst, Coleoptera, vol. 7, 1797, p. 328, says: "This beetle is everywhere very common in rooms, on buds, and especially common on tulips. It destroys, as well as its relatives, collections of insects and plants. The larva lives in the houses, like the *Dermestes*, and destroys all kinds of collections of natural objects, cloths, furs, leather and victuals." The variety of *A. scrophulariæ*—*sutura grisea*—is described from Europe by Illiger, 1798, p. 398. F. Wiegmann, Handbuch der Zoologie, 1832, p. 308: "The larva lives on animal matters, and is sometimes very injurious to hides."

I have ascertained this summer that the carpet bug eats of a piece of cloth consisting half of worsted, half of cotton, only the worsted threads, and left the cotton threads uninjured.

I may add some words concerning the list of the obnoxious insects introduced from Europe into America. It is, as I believe, overlooked that about three-fourths of the insects enumerated are surely not originally European insects. They were introduced into Europe from the East by the advancement and progress of culture, and in the same way by the advancement of culture from Europe to America. The same is the case with the common weeds, and some years ago, by carefully comparing the list of European weeds in Prof. Ratzeburg's work with the lists of the described American plants, I found out that two-thirds of all European weeds are common in the United States, and perhaps a part of the last third, of which I was not able to make certain. I myself was at first much surprised to find in the middle of the prairie, near the railway to St. Paul, Minn., common European weeds. I should state that I share entirely in the wishes of the inhabitants of N. America to receive and enjoy progress and advancement of culture, without the accompanying drawbacks which nature seems to have so closely united with them.

After all, I should state that it is remarkable that such pests as the Colorado beetles emigrate very exceptionally from the west to the east; so the locust tree is even now entirely free from pests in Europe, though imported a century ago and very common everywhere. There are some American insects imported into Europe which have been overlooked. *Blatta Americana* is common in all sugar refineries to Archangel, and everywhere in large cities in store-houses. *Termes flavipes* is probably also imported from this continent. *Blatta orientalis* was imported

from Asia to the west of Europe, and made from there a well ascertained migration to the east again and through Siberia. All insects finding it easier to live in the company of man, or by articles used and needed by man, will of course follow him as well as dogs and rats.

Mr. Lintner has not mentioned *Phylloxera*, which has in Europe done more injury and has caused more losses than almost all the other pests together.

THE GENERA OF THE HESPERIDÆ OF THE EUROPEAN FAUNAL-REGION.

BY DR. A. SPEYER.

(Translated from the Stettiner Entomologische Zeitung for 1878, pp. 167-193.)

(Concluded from August No., p. 154.)

CATODAULIS.*

♂. Antennæ much longer than half the costal margin of the forewings, nearly three-fourths as long as the body, uniform black, at two-thirds of their length expanding into a slender fusiform club, the last third of which is suddenly bent at a right angle; from this point forwards it is rapidly narrowed, but not very acute, nor curved into a hook. Locklet of hair of medium length and of the usual structure. Palpi projecting the full length of the eyes beyond the front, the first joint thickly hair-scaled, the end joint moderately short, conical, almost horizontal. Tibiæ unarmed, the hind ones with four spurs, the outer one of each pair much shorter than the inner one. The tuft of hair begins on the base of the tibiæ and reaches (on the inside running downwards) to their end. Body not very robust, the head and thorax united equal to the abdomen, the latter not reaching the inner angle of the hind wings, and destitute of the

[* Dr. Speyer writes that this genus must give way to *DAIMIA* Murray, 1874.—L.]

ventral excavation. Wings large and broad ; hind wings undulate, with a deep sinus at the end of vein 5, their basal third of the underside covered with long matted whitish hair between the inner margin and the middle cell ; the remaining surface with prostrate scales. No costal fold. (2 ♂ from the Amur, and 1 from Yokohama, Staudinger.)

That *Pyrgus Tethys* Ménétries (*Enum. Corp. anim. Musci Petropolit.*, p. 126, Tab. x. fig. 8) neither belongs to the genus *Pyrgus*, nor to either of the other genera of European Hesperides, nor even shows close relations with them, is apparent upon a very slight examination. For that reason I am also less sure with regard to *Catodaulis*, whether it does not coincide with described exotic genera which are otherwise unknown to me, and consequently if the synonymy be not thereby unnecessarily increased. Herrich-Schæffer's Table of the genera does not indicate to me any genus corresponding with it. Kirby places *Tethys* in his genus *Erynnis* (= *Spilothyris* Bdv.), from which it is certainly to be inferred that he was not acquainted with this butterfly, whose *habitus* decidedly contrasts with that of every other European Hesperian. In *Pyrgus* A. we notice prominently the transparent spots of the fore-wings and the waved border of the hind-wings. With *Scelothrix*, *Tethys* has nothing but the tibial tuft in common.

The latter character is undoubtedly absent from the female, which is unknown to me ; and still further I do not know whether the shaggy hairiness of the hind-wings (which was the occasion for the adoption of the name) pertains to this sex. These hairs seem moreover not to adhere very firmly, for not a vestige of them appears in a male example which has been long on the wing, and is besides not everywhere present in equal completeness.

PYRGUS.

Club of the antennæ ovate or elongated, feebly compressed, straight, or not quite regularly falcate, rounded off at the end (except in *Poggei*). Lock of hair long. Palpi projecting more than the length of the eyes beyond the front, the middle joint bristly, the apical joint thick, bluntly conical, horizontal or directed obliquely forwards. Tibiæ unarmed (except in *cribrellum*), destitute of the tuft. Abdomen as long as the head and thorax united, reaching as far as to the posterior angle of the hind-wings. Fringe checkered.

- A. ♂ With costal fold.
 - a. Stoutly built species, with deeply waved-toothed (tief wellenzahnigen) hind-wings, and with transparent spots on the fore-wings.
 - b. Hind-wings more deeply dentated, or with the margins entire ; fore-wings without transparent spots.
- B. ♂ Without costal fold. Hind-wings slightly dentated.
 - a. Club of antennæ longer than in the other species, bent behind the middle, and thence to tip much reduced. Male with a trace of the costal fold.
 - b. Club of the antennæ straight or only slightly bent, rounded at tip.

This is, after *Pamphila*, the least homogeneous genus, including species either with or without the costal fold, and which show some differences in the form of the club of the antennæ. The Division A. a. differs besides somewhat in *habitus*, and has therefore been regarded as a distinct genus. Essential differences I have not been able to find ; moreover *Proto*, in its *habitus* and expanse of wings, forms a connecting link between it and the other species. If it should be thought proper to give them generic distinction, the older name *Carcharodus* of Hübner would be confirmed, and under which he had correctly assembled the species and had sufficiently characterized them. Kirby places here (besides *Tethys* Mén.) one other species from America (*Carcharodus mazans* Reak.) which is unknown to me.

Alcea Esp. differs in the form of the club of the antennæ from the two next related, and in general from the other species of the genus. The last fifth of the very thick club is (nearly as in *Pamph. Alcides*) remarkably reduced and bent backward, and also rounded at the end. *Althaea* ♂ has a bunch of hair on the underside of the fore-wings ; *Lavatera* has none of these marks, but instead, particularly large hyaline spots. In the Division A. b. stands the only species of *Pyrgus* whose tibiæ (the middle and posterior) are armed with spines, and those moderately short (e. g. *cribrellum*). I have already mentioned this species as illustrating the small value for systematic purposes of the tibial spines in this family. But they offer a convenient mark for separating *cribrellum* and *tessellum*, which are sometimes confounded. *Proto* connects the group A. a. to B., especially to *Poggei*, and would, if it had no costal fold, be more naturally placed

next to it. In fact the costal fold is a little shorter and narrower than in the other species. This, and the circumstance that in *Poggei* there is the first intimation of a fold as a narrow seam in the membrane, militates against the generic separation of Divisions A. and B.

Poggei, in the form of its antennæ, recalls *Nisoniades*, but the bending of the club does not really begin in the middle, but a little behind it, and it is not so regularly falcate as in that genus. *Poggei* approaches so near to *phlomidis* and *Proto* in all other respects that a separation from them would only be justified if a number of agreeing species could be united to it.

SCELOTHRIX.

Club of antennæ elongate ovate, somewhat compressed, feebly falcate, rounded on the end. Locklet, palpi and fringe as in *Pyrgus*. Hind tibiæ without spines. Male with much developed costal fold; two membranous, sheath-formed appendages on the metasternum, and a long hair-tuft on the hind tibæ. The appendages start from the base of the hind legs and project more or less convergingly, occasionally being bent apart (feebly x-shaped) for nearly one-third the length of the abdomen, over the very deep and long ventral cavity. They are a pair of almost linear, rather flat, membranous, apparently hollow structures, at first sight to be compared with a short, broad sabre-sheath, thickly scaled, and on the front edge and particularly at the tip with longer hairs. Their form, clothing and color present some differences, which probably (but which I have not proven) will afford useful specific characters.

The tuft of the tibiæ, composed of long, fine pencil-like hairs, arises close under the knee of the hind tibiæ on the inner side. It is at least as long as the tibiæ, often considerably longer, and appears in captured specimens, generally, spread apart. When drawn in, it is placed under the sheath-like appendages—at least this is so in several specimens in my collection. Its color varies from pale yellow to black in various degrees of mixture.

This genus approaches so near to the preceding one (several of its species agreeing with it fully in *habitus*, color and marking) that the separation requires special justification, because the differences become conspicuous only in the male sex. But in this sex the differences are so highly developed and easy to detect,—the forms united thereby so homogeneous—that it seemed to me more reasonable to establish a new genus

than to add to the subdivisions of *Pyrgus* still another. Should transition forms exist, *Scelothrix* must certainly be absorbed, but no such forms are known to me:—the tibial tuft and the appendages are either completely developed, or entirely absent.

Maculata is characterized by very acute fore-wings, by the particular color and marking of their undersides, and above all by the white fringe being marked with black only on the upper side, and not both above and below as in the other species. Appendages of the pectus and tuft of the tibiae in the male well developed, the latter extending to the end of the first tarsal joint. The other species stand very close together, and it happens here again, as in other very natural groups, that the genera which are easiest to define, are those in which the species are the most difficult—declaring distinctly that if the genus should be easy to define, the parts of which it consists must be very homogeneous. Here are chiefly those species or varieties nearest to *alveus*: *fritillum*, *serratula*, *calacis*, and *andromedæ* (and quite independent of the Ramburian *cersii*, *carlinæ* and *onopordi*, concerning which nobody has accurate knowledge), which difficult in themselves to separate by fixed characters, become in the mass still more difficult to separate from their originals, the more that the number of specimens compared increases, and their localities widen. The reason for this may be that these forms have not begun until recent times (geologically speaking) to separate themselves from their common originals; and as species (in a systematic sense), have not yet become perfect, the intermediate forms still existing as such in many localities, while in others they have disappeared. The evidence for this last position appears to me to be given in the following observation. The two forms of the *alveus*-group, which occur here in Rhoden, are *fritillum* (H. 464–5, HS.) and *serratula* (HS. fig. 18–20); the supposed stem-species, *alveus* (H. 461–3) is entirely absent. The first two fly in the same locality (upon the Muschelkalk formation), which I visit diligently every year, and where I find my richest source for Diurnals and many other Lepidoptera. *Fritillum*, and also *serratula*, appear here in quite typical form, and I have not yet met with an example which has raised a doubt as to which of the two forms it should be referred, nor which had assumed the characteristics of *alveus*.

I found *fritillum* on this spot during the whole of June, and again at the end of August, and in September; also, during several years, singly, in the last half of July. In former years this butterfly appeared sometimes in large numbers, but recently it has become much more scarce.

Serratulæ, as well as I remember, for many years, had only once fallen into my hands in this place, where I found it in the evening, sleeping with two specimens of *fritillum* upon a flower. For the past ten years, however, I have annually (possibly as the result of more careful searching) found this species, but only in small numbers, between the end of May and the middle of June; but lately only in single badly weathered specimens. In Midsummer and Autumn I have never seen it here. This cannot be the spring brood of *fritillum*, as the time of flight of *fritillum* begins with the first of June, and only a little later than that of *serratulæ*. The latter flies also in the Alps, at the same time as the other related forms, in July and August.

Were I to base my judgment upon the occurrence of the two species in this vicinity, I would unhesitatingly pronounce them specifically distinct and easy to separate. But I am made very uncertain by specimens which I have found in Wildungen, only a little more than five miles distant from this place. There I found (on clay slates) the typical *alveus* and *serratulæ* moderately common, but *fritillum* only singly. Among the few specimens that I have yet in the collection is at least one *fritillum* ♂ with a strong inclination towards *alveus*, and a *serratulæ* ♀ of uncommon size, which might almost as well be referred to *alveus*. Besides, if I were to endeavor to distribute among the known types the numerous examples found in the different parts of the Alps, multifariously varying in their size, in the cut of wings, in color and markings, the uncertainty would rise to such a degree that it might easily be conceived how Meyer-Dür (*Tagfalter d. Schweiz*, page 218, fig.) draws together as forms of a single species all three of them and *cacaliæ*; yes, and even *carthami*. In the fact that the usually specified separative characters will not throughout stand the test, he is certainly correct.

Local and climatic influences, which are so productive of various modifications, particularly in restricted localities of high mountains, undoubtedly play a great part here; and it is naturally to be expected that, in places where the different forms live in large numbers in close proximity, the close limits among themselves would be obliterated by continual crossings.

At a former time specimens were sent to me under the name *cersii* Ramb., said to be from the vicinity of Paris, which had much white upon the upper side of the hind-wings and brick-red on the under side. They appeared to me at that time not to be specifically distinct from *fritillum*.

As *carlinæ* Ramb., Staudinger has sent a pair of the small *Scelothrix* from the Southern Tyrol, which are nearly related to *alveus* and *serratulæ*, but may be distinguished from them particularly in having narrower and more acute wings and less expanded hind margin (their fore and hind angles the more prominent on that account.) Three males taken upon the Gemmi well accord therewith. I would only regard them as a somewhat degenerated mountain variety of *alveus*.

NISONIADES.

Antennæ half as long as the fore-wings, their club somewhat compressed, slender, gradually dilated and then narrowed and more or less acutely produced, regularly curved, lunate-falcate. Locklet long. Palpi projecting upon the front to nearly twice the length of the eyes, with long and thick hairs, but less coarse than in *Pyrgus* and *Scelothrix*; the apical joint thick, bluntly conical, somewhat bent. Tibiæ unarmed, and without the tuft,* but with long hairs. Fore-wings triangular, outer margin not toothed, fringe unicolorous. Male with longer costal fold.

The peculiarly native country of this genus, scarcely more than represented in Europe, is North America. Scudder enumerates sixteen species, based chiefly upon differences in the form of the abdominal appendages, several of which, however, Edwards will not acknowledge to be good species. The characteristic feature is the form of the club of the antennæ, which is fusiform when stretched out, but which takes the form of a narrow crescent when in its regularly curved condition. This fundamental form is constant; the stoutness of the club and its degree of acuteness differs according to the species. In some American species it is very slender and finely pointed; in others, as in our *Tages*, it is thicker and more blunt, but never so suddenly rounded as in the preceding and following genera.

* In a letter received from Dr. Speyer as this is passing through the press, he desires to make the following correction in this diagnostic feature. The tibial tuft (see also foot of page 126) is not reliable for generic separation. A critical examination made by him of some of the species of *Nisoniades*, has shown its presence in *Persius* and *Iceus*; in the latter, quite strong. *Brius*, although so closely related to *Iceus*, is without the tuft. The detection of this marked difference in these two allied species, establishes their specific value, which has been questioned, and also shows that the presence or absence of the tuft is only of specific importance.—L.

Montanus Brem. is distinguished from the others above, which accord with it pretty well in *habitus*, by the particularly large hind-wings with expanded margin, also by the difference of color and marking; but it has all the essential characters of the genus. Its club is somewhat thicker than in *Tages*, but is otherwise of the same shape.

THANAOS.

Club of antennæ elongated, curved, shorter than in *Nisoniades*, suddenly swollen, and scarcely contracted at the well rounded tip. Forewings more elongate than triangular, the front margin more steeply arched above the base, the hind margin shorter. Male destitute of the costal fold. All the other characters as in *Nisoniades*.

The erection of a separate genus for *Marloyi* is more difficult to justify than even the somewhat artificial separation of the genus *Scelothrix* from *Pyrgus*. For the absence of a costal fold, their principal character, as has already been shown in *Pyrgus*, is insufficient to establish a generic value; the antennal club differs only in its shortness and stoutness, and no importance can be attached to the slight difference in the cut of the wings. All three of these features taken together induce me to consider it more proper, for strict systemization, to set apart this element which disturbs the establishment of a generic character for *Nisoniades*. In order to avoid constructing a new generic name, I have used that which Boisduval selected to include *Tages* and *Marloyi*.

May 20th, 1877.

ANNUAL MEETING OF THE ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCE- MENT OF SCIENCE.

The Club met pursuant to notice, at 2:30 on Tuesday afternoon, August 20, 1878, at room 17, The Lindell Hotel, St. Louis, Missouri.

The President, Mr. J. A. Lintner, of Albany, in the chair. In the absence of the Secretary, Mr. B. Pickman Mann, Prof. A. G. Wetherby, of Cincinnati, was appointed Secretary *pro tem*.

The President then delivered his

ANNUAL ADDRESS.

Gentlemen of the Entomological Club:

For the honor which you were pleased to confer upon me, at your last meeting, when I was unable to be with you, in calling me to preside over you, I am fully appreciative, and would return my grateful acknowledgments. While I well know that there are several among you who far better deserved the honor of succeeding to the chair vacated by my illustrious predecessor, yet I would interpret your selection as a tribute to my devotion to our loved science, and to my earnest desire to aid in its progress to the extent of my humble ability.

On these annual gatherings, marking the lapse of a period signalized by progress equaling, even surpassing that of a decade but a few years ago, it would seem fitting and proper that a comprehensive view of that progress should be given. But this has been so ably done by one of our number, and you have had it presented to you in the pages of *Psyche*, that whatever I might say, in this direction, would be but repetition.

Permit me then, instead, to refer to some evidences of progress in American Entomology, shown within the recollection of several of us here present. Going back forty years, very little was known of our abundant insect fauna, except of the Coleoptera, an order which enjoyed the good fortune of being an attractive one, easy to collect in and prepare for the cabinet, and which early enlisted in its study earnest students, who have since lent honored names to the annals of American science. Thus, in 1835, in Harris' List of the Insects of Massachusetts, the names of 994 Coleoptera are given, and but 140 Lepidoptera. Of the latter, 34 are butterflies, four of which are erroneously referred to European species: among these only three species of Hesperidæ are mentioned. Seventeen species of Noctuidæ are recorded, with the additional note of "96 unnamed species." There are also the names of 7 Geometers, 1 Pyralid, 1 Tortrix and 6 Tineids. How great an advance upon this in our knowledge of forms is shown in the Crotch Check List of 7,450 species of Coleoptera, in the Grote Check List of 1,132 species of Noctuids (already quite incomplete from the species subsequently made known), and in the the Edwards Catalogue of 506 species of Butterflies (110 of which are Hesperidæ). I often recall, as I am reminded of past progress, a request

of Dr. Fitch, soon after the commencement of his Reports, for my careful attention to the Catocalas, for the authorities of the British Museum were, he thought unnecessarily, multiplying species. He did not believe that we really had over a half dozen species. To-day we number over 90 accepted species.

At the time to which I have referred, very few—perhaps not over a score (my limited knowledge of the Coleoptera must be my excuse if I err) of the histories of our insects were known; now, we may count by the hundred those of which we know the transformations and the life histories more or less complete. Some of these, thanks to the labors of Edwards, Riley, Scudder, Walsh and others, have been charmingly wrought out, and are honorable contributions to science.

The list of working Entomologists is rapidly enlarging, and with the consequent diffusion of a knowledge of their purposes and their results, we have reason to believe that the day is not far distant when the opprobrious prefix of "crazy" will not invariably be associated with "bug-hunter." In the last edition of the Naturalists' Directory, the names of 281 persons are recorded who are making Entomology their study in North America. It is probable that a full list would be increased by at least 25 per cent., extending the number to 350.

With so large a number of working Entomologists, we would be justified in expecting larger annual contributions to our literature. It would seem to me but a moderate estimate that one-third of the number should possess the ability of making such careful observations and of collating them in such a form that they would prove acceptable and valuable contributions to our knowledge. While we know so little of the transformations of our species, the habits of their larvæ and imagines, their geographical distribution—in short, the numerous details entering into and composing their life histories, there is scarcely a new fact relating to these particulars which is not worthy of being placed on record in the pages of our Entomological journals, which will gladly give them place. It has been stated that there are but about thirty Entomologists in the United States and the Dominion of Canada who are in the habit of publishing the results of their observations and studies. The last volume of the CANADIAN ENTOMOLOGIST presents a list of forty-five contributors; and Mr. Scudder, in his review of the work done during the year 1877, to which reference has been made, gives an account of the publications of

forty-one writers, seven of whom have discussed injurious insects only. We wish that this latter number had been much larger.

A marked improvement has been shown in the number, extent and character of Entomological collections, both in public institutions and in private hands. It is most earnestly to be hoped that the growing appreciation of the value of these collections may demand and ensure their proper care and future preservation. To this end it is very important that each individual possessing a valuable private collection (and there are now a respectable number distributed through the several States which contain 5,000 examples) should make such arrangements for its disposition and preservation after his decease as may, within a reasonable extent, ensure its perpetuity. The authoritative statement which has been made, that the extremely valuable collections of Drs. LeConte and Horn will at some future day be added to the collection which the ability and zeal of Dr. Hagen has built up at the Cambridge Museum, is highly gratifying intelligence. And in this connexion, let me endeavor to impress upon each one of you the service which you may render to science by availing yourself of every opportunity to urge upon those who have voice in the erection of buildings devoted to scientific collections, that a primary consideration be that they be made fire-proof.

The literature of our science has already become quite respectable, and its collection on our shelves forms no inconsiderable a library. The eleven volumes of the American Entomological Society represent a large amount of earnest and thorough work. The nine volumes of the CANADIAN ENTOMOLOGIST are replete with interest and instruction. The numerous papers scattered through the pages of the Reports of the Peabody Academy of Science, Proceedings of the Boston Society of Natural History, Annals of the Lyceum of Natural History of New York, Proceedings of the Philadelphia Academy of Natural Science, Bulletin of the Buffalo Society of Natural Sciences, Proceedings of the California Academy of Natural Sciences, and others, fully illustrate the earnestness with which Entomological study is being prosecuted, and give large promise of a brilliant future. The exquisite illustrations of the "Butterflies of North America" are a credit to our country, being fully equal to the best work of the class in Europe. The publications of LeConte have given him high place among the honored names of the fathers of American Entomology, while the writings of Hagen, Grote, Scudder, Packard, Horn, Cresson and Uhler represent no inconsiderable portion of the progress

upon which we are congratulating ourselves. Nor can I omit reference to our European friends — to Loew, Osten Sacken, de Saussure, Speyer, Zeller, Mœschler, Butler and others, who are freely lending us their valued aid in the descriptions of forms too numerous for our few hands, and in the solution of problems which require for their determination the study of the entire insect fauna of the eastern hemisphere in connection with our own.

The most gratifying feature, perhaps, in the report of progress which I am able to present to you, is the aid which the General Government is now extending to Entomological explorations and investigations, in placing scientists in the field and in the publication of their results. Two years ago, the occupant of this chair felt called upon to express to you his sorrow, disappointment, indignation, that Congress had declined to accede to the memorials presented it, asking its recognition and acceptance of the service which applied Entomology was in a condition to render. Now, it is a cause of congratulation that the Department of Agriculture has selected as its Entomologist one whose training in the school of economic Entomology for the past ten years has specially qualified him for the responsible position he occupies; and we have the additional gratifying assurance that the Secretary of the Department is in full sympathy with our aims.

In conformity with a precedent long since established in Europe, our Government has honored itself while honoring science, in seeking to add to the productive wealth of the country through a control of the insect depredations inflicted upon our people, to the extent of enormous annual losses, and, at times, poverty and starvation. The two special Commissions which have been already appointed, it is understood are, ere long, to be followed by others. The published results of one year's labor of the Locust Commission is in our hands. An inspection of the matter crowding its 772 pages will, I am sure, convince any one competent to judge, of the wisdom of the appropriation made for its support. The Cotton-worm Commission has already actively entered upon its work.

To Government aid we owe the publication of Packard's *Monograph of the Phalænidæ*—a beautiful quarto of attractive typography and ample and excellent illustration; Thomas' *Acrididæ of North America*, with 260 quarto pages and illustrations; the *Reports on Hymenoptera, Lepidoptera, Coleoptera, Hemiptera and Orthoptera* in Lieut. Wheeler's *Surveys West of the 100th Meridian*, of 331 quarto pages and several

chromo-lithographic plates; and to Reports on several orders of insects by Chambers, Grote, Hagen, Osten-Sacken, Packard, Scudder, Thomas and Uhler, in the Annual Reports and the Bulletins of the Hayden Survey of the Territories.

The liberality displayed by our Government in the publication and gratuitous distribution to those whose scientific labors render them worthy recipients, of investigations in other departments of Natural Science—in Geology, Palæontology, Mammalogy, Ornithology, Ichthyology, Botany, etc., deserves our most earnest commendation. The facility of publication thus afforded to meritorious work almost evokes the envy of some of our European friends.

In conclusion, permit me to commend to the members of the Club the biological study of our insect forms. It is attractive, it is simple in many of its phases, it is of great practical utility, it is a field where all can find abundant work, and one in which some of those questions which are engaging the attention of zoologists in other departments, may best find their most ready answer. Let no one be satisfied with the simple possession of a large and well arranged cabinet of insects. If to collect and own it be a source of pleasure, often beyond expression, then science may demand at his hands that he should aid in extending its boundaries in return; and in no better way can this be done than in working out the life histories of our species, beginning with those with which we hold the more intimate relationship. Let descriptions of forms remain, except in exceptional cases, for those who have special fitness and opportunity for the work; and systemization for him who, like the poet, *nascitur non fit*, that kaleidoscopic manipulation of genera and the higher groups may cease to bewilder, perplex and dismay.

In illustration of what may be done in the study that I commend to you, I would refer to the labors of Mr. W. H. Edwards in working out the histories of some of those butterflies which appear under different forms at different seasons of the year. Some of the results are known to you, and I am sure that you regard them as among the most valuable recent contributions to Entomology. The untiring zeal with which the work has been prosecuted and is being continued, deserves the commendation which it has received from the most eminent European Entomologists, and the success with which it has been crowned.

Gentlemen, I trust that our assemblage at this time may not only conduce to the interests of our science, but also render its pursuit more

pleasant to us, through the privilege it affords of personal acquaintance, comparison of observations, interchange of opinion, and the strengthening of those bonds of sympathy which should (they do not always) unite those who labor in a common cause.

On the motion of Mr. A. R. Grote, of Buffalo, a resolution was passed requesting THE CANADIAN ENTOMOLOGIST to publish the President's Address and the proceedings of this meeting.

Mr. E. B. Reed, of London, Canada, associate Editor of the CAN. ENT., apologized for the unavoidable absence of the Vice-President, Mr. Wm. Saunders, and stated that the Editor of the CAN. ENT. would be most happy to comply with the wishes of the Club respecting the publication of the proceedings of the meeting.

Mr. A. R. Grote exhibited some insects from Georgia—*Callosamia angulifera*, *Eacles didyma*, *Lagoa pyxidifera*, *Heterocampa obliqua*. In the South he had found that *Actias luna*, *Samia cecropia*, *Telega polyphemus* and *Saturnia io* were double-brooded, while on the contrary, *Citheronia regalis* was only single-brooded.

Prof. Wetherby stated that in his section, and in other parts also of the North-Western States, many of the above-named moths were also double-brooded.

Miss Emily A. Smith, of the Scientific Association of Peoria, Ill., submitted to the meeting a most interesting account of *Lecanium aceris* Fitch, a bark-louse that had seriously damaged the Maple trees, both hard and soft, in Illinois and adjoining States. The whole life history of this pest had been most carefully worked out by Miss Smith; who also exhibited a very complete set of microscopical preparations of the insect in its various stages, and also of a parasitic *Chalcid* discovered by her. One important point noted was the migration of the bark-lice on the approach of the fall from the leaves to the trunk of the tree, on which, however numerous they might be found together, their position was always lengthwise with the trunk. In the South the insect was doubtless double-brooded. Dr. Fitch had briefly described the insect many years ago, but Miss Smith had been enabled to work out many hitherto unknown points in its history.

Various experiments had been tried to destroy the lice, but Miss Smith had found the best success in using a Babcock or Chambers Fir

Extinguisher, charged in the usual way, with the addition of a little crude carbolic acid, in the proportion of about one large spoonful to six gallons of water. By means of the Extinguisher she was able to reach, even large trees, the cost being about 20 cents per tree. The remedy should be applied before the insects become too old, otherwise a stronger preparation of carbolic acid was necessary, and in consequence the trees might possibly suffer somewhat.

Mr. Thos. Bassnett, of Jacksonville, Florida, had listened to the admirable account with very great interest, inasmuch as in the South the culture of the Orange tree, in which he was largely interested, was seriously threatened with extermination by the ravages of a bark-louse similar to that described by Miss Smith, and he was glad to hear that a remedy could be so successfully applied.

Prof. C. V. Riley, of Washington, D. C., spoke, thanking the lady for bringing this subject before the meeting, and complimenting her on the discoveries she had effected. He fully corroborated the statements made as to the extent of damage caused by bark-lice, especially those affecting the Orange in the South. He strongly advocated the use of the "Extinguisher" in similar cases, but recommended that kerosene should be tried instead of carbolic acid; it would, he thought, be found of less injury to the trees, and would destroy the insect for some time after the formation of the scale, which the carbolic acid would not do. It should not be applied in excess; the ordinary proportion should be about one part kerosene to twenty of water.

The whole topic was very fruitful of discussion, and Miss Smith was much thanked for her paper and for the drawings and microscopical preparations that accompanied it.

On motion of Prof. Riley, seconded by Mr. Reed, a resolution was carried that a committee be appointed to prepare a report and submit to the next session of the Club, in regard to the quorum of members necessary to transact business.

The Chairman appointed the mover and seconder and Prof. A. G. Wetherby as the committee.

Prof. Riley gave a brief abstract of some of the Entomological papers he proposed to read to the Association.

(1) Notes on the life history of the blister beetles, and on the structure and development of the genus *Hornia* Riley.

- (2) On the larval growth of *Corydalis* and *Chauliodes*.
- (3) On the means by which Silk-worms issue from their cocoons.

Hornia was parasitic on the common humble-bee, and had been successfully identified by careful study, although in several important points it differed from the *Meloidæ* to which it belonged.

The further larval history of *Corydalis cornutus* was given by Mr. Riley, and was most interesting, especially to those members who had listened to Mr. Riley's first descriptions of this curious insect at the Detroit meeting. Mr. Riley had been very successful in elaborating the various points of difference between *Corydalis* and *Chauliodes*.

In discussion it was stated that the somewhat peculiar name of the "Hellgrammite Fly" for the *Corydalis* had been for many years in common use both on the Upper and Lower Mississippi; and that the equally curious name of "Dobson" was given to its larva, which was largely used for bait by the river fishermen.

On the paper relating to Silk-worms reference was made to Dr. Packard's recent theory on certain spines on the wings of Bombycidæ, which he stated were of service in assisting the exit of the insect from the cocoon.

Mr. Riley, in combatting this idea, showed how in almost every case the silk was spun in figures of 8, which would easily yield to pressure, especially as in most cases a fluid (wrongly termed bombyc acid) was emitted, and the silk thus rendered more pliable. His idea was that the peculiar make up of the cocoon rendered it more yielding for the exit, and that though the insect usually emerged at the end of the cocoon, there seemed to be no reason why, if it chose, it could not find an egress equally well at the side of the cocoon.

Several minor matters were discussed, and the Club adjourned at the call of the chairman.

(To be Concluded in October No.)

BOOK NOTICES.

Entomological Contributions, No. iv., by J. A. Lintner.

We tender our sincere thanks to the author for an early copy of this fourth part of his admirable work, which appears in form similar to the previous issues, and occupies 144 pages.

It opens with a chapter on *Mermis acuminata*, a parasite on the larva of *Carpocapsa pomonella*; then an admirable account of the life history of the new Carpet Bug, *Anthrenus scrophulariæ*, with magnified illustrations of the insect in its several stages; following which are chapters on *Isosoma vitis*, the Lepidoptera of the Adirondack region of New York, Collections of Noctuidæ at sugar at Schenectady, on some Lepidoptera common to the United States and Patagonia, on *Lycænà neglecta*, new species of Californian Butterflies, on some species of *Nisoniades*; descriptions of new species of *Cerura*, *Xylina*, *Hypocala*, *Acidalia*, *Cidaria*, besides a number of valuable notes on Lepidoptera illustrative of their life history and habits and geographical distribution. Every subject is treated in the author's usual thorough and systematic manner, and the work forms a valuable addition to our constantly increasing Entomological literature.

On the Tongue (Lingua) of some Hymenoptera, by V. T. Chambers. From the Journal of the Cincinnati Society of Natural History, April 1878—8vo., pp. 13.

This paper is very interesting and instructive, and is intended as a reply to the questions—What do bees eat? and How do they eat it? An illustration of a transverse section of a bee's tongue accompanies the text.

Manuscript Notes from My Journal: Cotton and the principal insects, &c., frequenting or injuring the plant in the United States, by Townend Glover.

This excellent contribution to economic Entomology is published uniformly with the previous portions of "Manuscript Notes from My Journal," reviewed in earlier numbers of the CAN. ENT., that is, in quarto form, the text written and etched by the author, and afterwards printed from stone. The admirable plates, 22 in number, constitute in this instance the most considerable portion of the work and illustrate not only the insects which injure the cotton crop, but also certain forms of fungoid disease to which the plant is subject. A work so instructive and useful as this would be to those engaged in this important branch of Southern agriculture should be widely circulated. The small edition published has been got up at the author's own expense, who has distributed the copies with the most liberal hand, free of any charge, among the libraries of the various scientific societies in the country; they are not, however, access-

ible to the general public. The untiring industry of this talented Entomologist is a marvel to all those who know of his work. It affords us great pleasure to find that he has so far recovered from his late severe illness as to enable him to resume those Entomological studies in which he has so long taken a prominent part.

Butterflies and Moths of North America, by Herman Strecker, Reading, Pa.

We are indebted to the author for a copy of this work, which is in large octavo form, in paper cover, containing 283 pages.

Following the preface, which partakes somewhat of the character of an advertisement relating to the sale and purchase of insects, the reader will find a series of short but very instructive chapters on breeding, collecting, mounting, preserving, transporting and classifying specimens, occupying some 26 pages in all, in which the author's long practical experience and thorough knowledge of the subject is presented in a plain and practical manner. He proceeds on the very admirable plan of explaining everything down to the minutest details, so that a reader who knows nothing of the subject when he takes the work up, has, after a careful perusal, a very fair knowledge of the whole matter. This part is illustrated by one plate; a second plate is devoted to illustrating the structure of butterflies and moths. The author's style is peculiar, but interesting and racy; we sincerely regret that this otherwise highly useful portion of his work is marred somewhat by the occasional treatment in a flippant manner of subjects which others deem sacred.

There is a very complete list of the terms and abbreviations used in works on Lepidoptera, with plain and full explanations, following which is an alphabetical list of localities of which something of the Lepidopterous fauna inhabiting them is known. Next we have a very full synonymical catalogue of American butterflies north of Mexico, with localities in the form of marginal notes, which, with appendix, occupies the larger portion of the work. A Bibliographical chapter of 75 pages closes the volume, in which is found an alphabetical list of authors who have written on Lepidoptera, with full details of their writings.

On the whole, we regard this work as very convenient and useful. The preparation of it must have involved an immense amount of labor, which has been performed in such a manner as to reflect credit on the author.

The Canadian Entomologist.

VOL. X. LONDON, ONT., OCTOBER, 1878. No. 10

THE ANNUAL ADDRESS OF THE PRESIDENT OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

To the Members of the Entomological Society of Ontario :

GENTLEMEN,—Each revolving year brings its duties. To-day it is my privilege and a very pleasing duty to offer again to you a few words of encouragement, to refer briefly to some of the Entomological achievements of the past, and do what I can towards stimulating to further effort. The importance of the study of Entomology is yearly impressing itself more and more upon the public mind, as insect foes hitherto scarce become abundant, or as new ones invade our domain.

At present we are in danger from the approach of a new insect enemy which promises to give us a great deal of trouble. I refer to the new Carpet Bug, *Anthrenus scrophulariæ*. It was during the summer of 1874 that attention was first called by some of the newspapers in the Eastern States to the great damage being done to carpets in some of their cities on the sea-board by the ravages of an insect quite different from the well-known Carpet Moth, *Tinea tapetzella*, and far more destructive ; one which would attack new carpets as readily as old ones, and devour their substance with such rapidity and persistence as to raise a doubt in some minds as to whether, in case this insect becomes generally prevalent, the use of carpets could be continued at all. Two years later this pest was found common in Schenectady, N. Y., when they were shortly brought under the notice of one of our most active and thorough workers in the Entomological field, Prof. J. A. Lintner, of Albany, N. Y., who at once proceeded to investigate the life history of the insect. Up to this time little or nothing was known here in reference to it, other than that the destructive creature was a larva of some sort, nearly oval in form and about three-sixteenths of an inch long, with the body clothed with short

hairs which were longer at each extremity. A number of these larvæ were collected and fed upon pieces of carpet, and their transformations carefully watched until the disclosure of the perfect insect, when it proved to be a member of that very destructive family of beetles known to Entomologists as the Dermestidæ. This insect, which proves to be a European species, has probably been imported from Europe with carpets brought to New York and Boston, at which ports its destructive efforts first attracted attention. The beetle, the parent of all this mischief, is a very small one, being not more than one-eighth of an inch long, and one-twelfth of an inch broad ; it is nearly oval, black, with faint red and white markings. It does not confine its attention to carpets, but will eat any sort of woollen goods, but does not appear to injure those of cotton. In Europe it is said to destroy furs, clothes, collections of animals, insects and plants, and is sometimes very injurious to leather. A more detailed description of this insect and its workings, as furnished by Prof. Lintner's observations in his recent "Entomological Contributions," will be given in the annual report of our Society. As this insect has for some time past been committing great ravages in Buffalo, N. Y., it is not likely that we shall be long free from it ; indeed it is altogether probable that it is already in our midst, although I am not aware that it has yet been brought under the notice of any of our Entomologists. Unfortunately it is a very difficult pest to destroy. The ordinary applications, such as camphor, pepper, tobacco, turpentine and carbolic acid, have, it is asserted, been tried without success, and no effectual means for its destruction has yet been devised.

Strange that so many of our most injurious insects have been brought from Europe, and that when introduced here they multiply to a far greater extent than in their native home. This rapid increase doubtless arises from the fact that they have numerous parasites in the place of their nativity which prey on them, and that these parasites are rarely imported with them, and hence it becomes a question of great practical importance as to whether these parasites might not by special effort be introduced, and thus materially lessen the losses which these scourges inflict on the community. We are indebted to Europe for the Codling Moth of the apple, *Carpocapsa pomonella* ; the Currant Worm, *Nematus ventricosus* ; the Oyster-shell Bark Louse, *Aspidiotus conchiformis* ; the Cabbage Butterfly, *Pieris rapæ* ; the Currant Borer, *Ægeria tipuliformis* ; the Hessian Fly, *Cecidomyia destructor* ; the Wheat Midge, *Diplosis tritici* ; the Grain Wee-

vil, *Sitophilus granarius* ; the Cheese Maggot, *Piophilæ casei* ; the Cockroach, *Blatta orientalis* ; the Meal Worm, *Tenebrio molitor* ; the Bee Moth, *Galleria cereana* ; the Carpet Moth, *Tinea tapetzella* ; the Clothes Moth, *Tinea vestianella* ; the Bacon Beetle, *Dermestes lardarius*, and several others of lesser note.

It cannot be denied that there has been some reciprocity in the matter. We have given Europe the noted *Phylloxera vastatrix*, which has inflicted damage to the extent of millions of dollars on the vineyards there ; they have also received now from us the much-dreaded Colorado Potato Beetle.

During the past season we have had a fair share of destructive insects. The Forest Tent Caterpillar, *Clisiocampa sylvatica*, has again been numerous in the district about London and in many parts west of it, but not so abundant as last year. The severe frosts in May destroyed myriads of the very young larvæ then newly hatched, and later in the season there prevailed among the nearly full-grown larvæ in some localities a strange disease which carried them off by hundreds. I myself saw large numbers of them still retaining their hold on fences and tree trunks, which, when touched, were found quite dead, and so decayed as to burst with a very gentle handling. Very many have also been destroyed in the larval state by parasites ; probably one-half or more will perish from this cause alone. Birds also have devoured many of them. On one occasion the crop of a black-billed cuckoo, *Coccygus erythrophthalmus*, was brought to me packed entirely full of these larvæ. Even their clusters of eggs, which they deposit in rings upon the twigs of trees, are not free from attack. Last winter I discovered a species of mite preying upon the eggs and devouring them rapidly ; many clusters were found entirely destroyed in this way, others partially so, and as each cluster would contain probably two or three hundred eggs, some idea may be formed of the benefits conferred upon us by these tiny mites.

The Colorado Potato Beetle is still spreading eastward through the Maritime Provinces, and has this year reached St. Johns, New Brunswick, but it is no longer the fearful evil at first anticipated, and our farmers battle with it confidently, knowing that with a little perseverance in the use of Paris green, they can ride victorious over this formidable foe. The use of this poisonous substance has provoked much discussion, and unnecessary alarm has been excited by some writers, who have expressed grave fears that the use of so much Paris green would eventually poison the soil

to such an extent as to render it permanently unfit for the growth of other crops. Several years ago Prof. W. K. Kedzie, of the Michigan Agricultural College, when experimenting in this direction, demonstrated that water charged with carbonic acid or ammonia dissolved a certain portion of the Paris green, but that this was quickly converted into an insoluble and harmless compound by combination with the iron which exists in almost every soil. As rain water always contains more or less of these ingredients, it is more than probable that the small portion of this poison used on potato fields soon loses its poisonous properties in this manner. In any case, one pound of the green spread uniformly over an acre of soil would only amount to less than one-sixth of a grain to the square foot, so that were the poison to remain unchanged, this minute portion might be added to the soil annually for a century without producing any perceptible deleterious effects on plant growth. It is to be regretted that any one should attempt to excite needless alarm in this way. Caution should be urged in handling this powerful poison, and it is often the case that more is used than is needed; these points are important and cannot be too often referred to. Paris green is best and most economically used with water in the proportion of one teaspoonful of the powder to a pailful of water, kept well agitated and sprinkled on the potato plants by means of a hand whisk dipped from time to time into the liquid. If the Paris green is pure this proportion is ample, but too often this useful compound is largely adulterated, a practice which some dealers are tempted to adopt from the eagerness with which a large portion of the public run after cheap goods. Paris green is frequently adulterated to the extent of from twenty-five to fifty per cent., chiefly with sulphate of baryta, a cheap and harmless mineral compound. By resorting to practices of this sort dishonest dealers can supply their customers at a less price than the cost of the pure article, and at the same time make large profits. It is a matter of regret that with an Adulteration Act in force, which if properly carried out would at once put an end to these and all such impositions, the public are not better protected.

The insect enemies of the Potato Beetle are in some localities rapidly increasing in numbers. In the annual report of our Society for the year 1871, our esteemed coadjutor, Mr. E. B. Reed, contributed an excellent article on the Potato Beetle, in which he enumerates a number of insects which prey upon this pest in the various stages of its growth, and among them refers to a species of *Lebia*, one of the active members of that family

of beetles known as Carabidæ, all of whom devour other insects. This species, *Lebia grandis*, is there said to be rare in Ontario. The first examples of this insect which I remember capturing were taken last year at sugar when trapping moths, and I believe it is the only species belonging to that family which I have ever taken in this manner; several of them were found feeding on the sweet liquid on dark nights about 10 o'clock. Early this fall I received a letter from Mr. W. E. Coldwell, of Constance, Ont., announcing the appearance in large numbers of a friendly insect, which was devouring the larvæ of the Potato Beetle, and proving a very effectual check on their increase. This letter was accompanied by specimens of the insect, which, to my gratification, I found on examination were examples of *Lebia grandis*. A few weeks later a farmer in this neighborhood called on me with the information that he had observed large numbers of an insect which he had not seen before, devouring the larvæ of the Potato Beetle. He brought no specimens with him, but from his description of the insect I have every reason to believe that it was the same *Lebia*. Since then I have occasionally met with examples of this friendly visitor hidden amongst the leaves of plants, a common place of resort for it during periods of inactivity.

The Hessian Fly, *Cecidomyia destructor*, which appeared in force in many counties of our Province last year, and which it was feared might again become a serious trouble, has happily almost disappeared. I have not heard of any serious loss from this pest during the past season. Should any of you desire, at any time, information in reference to the life history and habits of this insect, I would refer you to a very practical paper in our last annual report, by the Rev. C. J. S. Bethune; also to a more elaborate paper by the same distinguished Entomologist in our report for 1871.

The Cabbage Butterfly, *Pieris rapæ*, still continues its ravages, but does not seem to be quite so abundant this year as it was last. Water heated to near the boiling point has been used with success in destroying the larva, without injuring the cabbage. Strong decoctions of Cayenne pepper and Smartweed (*Polygonum*—?) have also been spoken highly of; but I look forward with far more confidence to a remedy provided by nature which is gradually making itself felt. I allude to that tiny little friendly parasitic fly, *Pteromalus puparum*, which is rapidly increasing in our midst. A few days since, while watching some of the full-grown larvæ of the Cabbage Butterfly which were feeding on Nasturtium leaves, I was much gratified in witnessing the method of attack which this parasite

adopts. Settling herself quietly down on the back of the caterpillar, near the terminal segments, with her head towards the caterpillar's head, she paused awhile ; then with a sudden movement of her ovipositor, so quickly that the motion almost escaped detection, she thrust an egg under the skin of her victim. The caterpillar seemed startled, and quivering, jerked its head and anterior segments suddenly about, and then quieted again ; the little tormentor meanwhile sitting perfectly composed on the spot where she first settled. Presently another thrust was made, followed by further uneasy movements of the larva, and in this manner, in the course of a very few minutes, quite a number of eggs were deposited. The caterpillar did not seem to be conscious of the cause of its troubles, nor, indeed, of the presence of its enemy, excepting when the thrusts with the ovipositor were made. On drawing a little nearer for the purpose of better observing this interesting operation, the tiny creature took alarm and flew off. Further examination revealed the presence of several more of these little friends, busily searching for further specimens to operate on. The eggs deposited soon hatch into little grubs, which eventually devour the body of their victim, and after it has entered the chrysalis state, eat small holes through the chrysalis, and thus make their escape. It has long been an unsettled point among Entomologists as to whether this parasite operates on her victim in the larval or chrysalis state, the weight of opinion being hitherto in favor of the view that the chrysalis is pierced and the eggs deposited in it ; but from the observations here detailed it would appear that the eggs are usually, if not invariably, placed in the nearly full-grown larva.

At the same time I observed an insect belonging to the true bug family, Hemiptera, with its proboscis thrust into one of the same caterpillars, quietly sucking out its contents, the half-emptied victim vainly endeavoring to escape. As this bug was immature, I was unable to determine the species to which it belonged ; it is pleasing, however, to know that there are several friendly helpers among the insect tribes aiding man in his efforts to subdue this obnoxious insect.

The Codling Moth of the apple is less abundant than usual this year, a scarcity which may be attributed to the early hatching of the moths during the very warm days of spring, and many of them perishing before the blossoms of the apple were sufficiently far advanced for them to operate on. Attention has been called again to the curious fact already noted in Europe many years ago, that the larva of this insect is sometimes

occupied by a strange parasite, a species of *Mermis*, known commonly as a hair-snake, a name probably due to the absurd belief, not yet quite extinct, that horse-hairs placed in water eventually become endued with life, and change to hair-snakes. Several instances have occurred of late in the United States of these remarkable creatures being found in the interior of apples, where they had lived as parasites on the Codling worm, and having destroyed their host, remained in the fruit about the middle, where they were in danger of being eaten.

The Plum Curculio is no longer a stranger in that once famed plum-producing district of which Goderich is the centre. So plentiful has it become there now that some plum-growers are becoming quite discouraged and ready to give up the culture of the fruit entirely. This troublesome insect has not yet been reported from the Owen Sound district, where plum culture is still extensively and profitably carried on.

The importance of the study of Natural History in our schools, especially the branch of Entomology, is beginning to be recognized, and I trust the day is not far distant when every public school will have its museum of Natural History objects, where the children can be taught with the specimens before them the names and habits of the commoner mammals, birds, insects and plants with which they must constantly come in contact. Such studies would, in my opinion, strengthen the intellect and cultivate the memory and other faculties of the mind more thoroughly than many of the more abstract studies now specially designed for that purpose, while the practical value of such knowledge to the fortunate possessor in after life can scarcely be over-estimated. I am glad to state that at the Model Farm in Guelph the important study of insects injurious to agriculture is regularly taught with the aid of a very fair collection of specimens.

The meeting of the Entomological Club of the American Association for the Advancement of Science was held this year at St. Louis, where some very interesting papers on destructive insects were read, and some curious facts in reference to insect life elicited. Our Society was ably represented by a member of our Editing Committee, Mr. E. B. Reed. It will doubtless be a source of gratification to you to learn that your President has again been honored with the Vice-Presidency of that distinguished body of naturalists.

During the year some interesting additions have been made to our Entomological literature, which we can only now partially and briefly

enumerate. Among the most valuable are the "Entomological Contributions," by J. A. Lintner; "Descriptions of Noctuidæ," by A. R. Grote; "Food Plants of the Tineina, with Descriptions of New Species," by V. T. Chambers, both published in the Bulletin of the United States Geological and Geographical Survey; "Manual of the Apiary," by A. J. Cook; on "Sexual Dimorphism in Butterflies," by Samuel H. Scudder; also several papers by the same author on fossil insects found in the Rocky Mountains, and in the Tertiary Beds at Quesnel, in British Columbia; "Insects Injurious to the Cotton Plant," with many plates, by Townend Glover; "On the Butterflies and Moths of North America," by Hermann Strecker. Several additional numbers of Edwards' "Butterflies of North America" have appeared, each one rivaling or surpassing its predecessor in the exquisite beauty of the plates illustrating the species described.

The publications of our own Society have been creditably maintained. Our annual report to the Department of Agriculture for the past year has been very favorably noticed, and our CANADIAN ENTOMOLOGIST has been issued regularly, its pages being well filled, chiefly with the records of original observations. The contributors to our last volume numbered no less than forty-five, and included the names of nearly every Entomologist of note on the continent. During the year we have published two handsome lithographic plates, one on wood-boring beetles, illustrating eight species; the other, which is printed in colors, exhibits the full-grown larva of that rare and interesting moth, *Samia columbia*. Among the most valuable papers I would mention those of W. H. Edwards, on the preparatory stages and dimorphic forms of butterflies; and one by the same author detailing the notable discovery of secretory organs on the hind segments of the larvæ of *Lycæna pseudargiolus*, from which is discharged a sweet fluid which induces the attendance of ants, who in return for the sweets thus provided them, defend these larvæ from their enemies. Our pages have been enriched also by valuable papers on the Noctuidæ and Pyralidæ, by A. R. Grote; on gall insects and other subjects, by Dr. H. Hagen; on Tortricidæ, by C. H. Fernald; on Tineina, by V. T. Chambers, besides many others, which time will not permit me to enumerate. During the past three months we have published in three portions a translation from the German of a very valuable paper by Dr. A. Speyer, on the Genera of the Hesperidæ, which paper, we trust, will be the means of bringing about such a re-arrangement of the species contained in this interesting family of butterflies as will be acceptable to Lepidopterists, and

at the same time, one likely to be permanent. It is through the kindness of Prof. J. A. Lintner, of Albany, that this translation has been supplied to us.

The practice of capturing our night-flying moths by the method of trapping, known to Entomologists as "sugaring," is still persevered in by most of our more active members, and with great practical results. Species which formerly were regarded as the greatest rarities have in many instances been taken in large numbers, while many new discoveries have rewarded the most persistent workers in this interesting field of research. As an example of the results of such work we would refer to a paper published in the CANADIAN ENTOMOLOGIST for November, 1877, on "Catocalæ Taken at Sugar, at Center, New York," by Dr. James M. Bailey.

During the past year that talented and energetic Entomologist, Prof. Townend Glover, of Washington, has, in consequence of ill health, been obliged to resign his position as Entomologist in the Department of Agriculture. While deeply regretting the cause which necessitated the change, I am pleased to be able to record the graceful recognition of the importance of Economic Entomology by the heads of the Department in Washington, in appointing Prof. C. V. Riley to fill this high position, a man who has done so much by his valuable reports as State Entomologist of Missouri to popularize Entomology and to disseminate practical information in reference to our insect pests throughout this continent.

In our last annual report reference was made to the appearance of the first of a series of practical works on Economic Entomology by that renowned Entomologist, Andrew Murray, F. L. S., of South Kensington Museum, London, England. This work treated of some of the lower forms of insect life and their allies, and was to have been followed by seven additional volumes, all having a practical bearing on this subject, so important to the agriculturist. I then expressed the hope that this talented author might be spared to complete the series of useful works proposed, and thus leave behind him a lasting monument of his industry and devotion; but not long after this the sad news reached us that he had ceased from his labors—that he had been called away by death. Thus "man proposes but God disposes." It is commendable to lay our plans for usefulness in life, and to labor as opportunity offers with diligence, knowing that our time is short, and that the most useful life will soon—as far as this world is concerned—be at an end; but I love to think that when our work here is done, our happy lot may be to find in a purer state

new fields of labor, where, free from the impediments which now obstruct our progress, we may study with much greater advantage the wonderful works of the Infinite Creator.

Thanking you for your kind attention,

I remain, yours very sincerely,

WM. SAUNDERS.

ANNUAL MEETING OF THE ENTOMOLOGICAL CLUB OF
THE AMERICAN ASSOCIATION FOR THE ADVANCE-
MENT OF SCIENCE.

(Concluded from September No.)

August 21st, 1878.

The Club met in the same place at 3 o'clock p. m., the President in the chair.

There was a much larger attendance than yesterday of members and those interested in Entomology.

The first order of business was the reading of the report of the special committee appointed yesterday. Mr. Reed presented the report.

The committee to whom was referred the question of the constitution of a quorum beg to report as follows :

Whereas it is most desirable in the interest of the Club that a definite and permanent character should be given to all its proceedings, and that nothing should be left undone which would tend to establish complete confidence in the manner of transacting the business of the Club,

Your committee therefore recommend that the constitution be amended by providing

(1) That no business of the Club shall be transacted unless there are present a quorum of ten persons, who shall have been enrolled as members of the Club at least one year previous to the then session.

(2) That when motions shall have been carried by the Club, the same shall not be rescinded at any subsequent meeting unless there be present as many members as were present at the date of passing such motions.

Your committee recommend that this report be printed and a copy sent to each member of the Club, and that it be brought up for discussion at the next annual session of the Club.

August 21, 1878.

C. V. RILEY,

A. G. WETHERBY,

F. BAYNES REED.

The report was unanimously adopted.

The Club then proceeded to the election of officers.

On motion, duly carried, the following gentlemen were re-elected officers for the ensuing year:

Mr. J. A. Lintner, Albany, N. Y. - President.

Mr. Wm. Saunders, London, Ont. - Vice-do.

Mr. B. Pickman Mann, Cambridge, Mass. - Secretary.

The President returned thanks for the honor conferred upon him. He then addressed the Club, giving a most interesting description of the success that had attended his efforts and those of his co-laborers in collecting Noctuidæ during the season of 1877, by the means known as "sugaring." By reference to a list given on page 120 of his "Entomological Contributions," No. 4, it would be seen that there had been captured eighty-six species, not one of which had hitherto been taken in the Albany district. Nearly all of these had been found in the famous Center locality. He most graphically described his manner of working by this method, and strongly recommended its trial to all the members.

Prof. Wetherby made some remarks on this attractive means of capture, which was continually bringing under the notice of Entomologists specimens hitherto unknown or considered as most rare. It was a question if there were any species which are in reality rare, their seeming rarity resulting from our not knowing when, where and how to collect them.

Miss Smith described a collecting bottle of her own device, by which, on touching a spring, the cover flew back and the insects could be readily caught in the receptacle. Its chief recommendation was that it could be managed by one hand, leaving the other at liberty for holding the lantern.

Mr. Reed advocated the fastening of the lantern to the waist by a belt, thus leaving the hands at greater freedom to use the bottles and boxes.

The President said he had found that in using the ordinary bulls-eye lantern the fingers could be thrust through the wire handle in such a manner that their ends and the thumb were free for use in withdrawing, hold-

ing and replacing the stopple of the collecting bottle. The lantern in hand enabled him more readily to adjust the light, and he had found that it was often more desirable to throw the penumbra rather than the full light upon the tree, many insects often fleeing from a strong light.

Miss Smith gave an account of the damage done to the oaks in Wisconsin and Illinois by the larvæ of a little Tortrix, *Argyrolepiæ quercifolia* Fitch.

A very interesting discussion took place on the question of instinct or reason displayed by insects, and many curious instances were cited proving that instinct and reason differ in degree and not in kind.

The meeting then adjourned.

LECANIUM TULIPIFERÆ.

BY A. J. COOK, LANSING, MICH.

On page 218 of the "Revised Manual," in speaking of other sources than flowers from which bees collect sweets, I remark that I have seen the bees thick about a large bark-louse, which attacks and often destroys one of our best honey-trees. This is an undescribed species of the genus *Lecanium*.

In the summer of 1870, this louse, which, as far as I know, has never yet been described, and for which I propose the above very appropriate name, *tulipifere*—the *Lecanium* of the tulip tree—was very common on the tulip trees about the College lawns. So destructive were they that some of the trees were killed outright, others were much injured, and had not the lice for some unknown reason ceased to thrive, we should soon have missed from our grounds one of our most attractive trees.

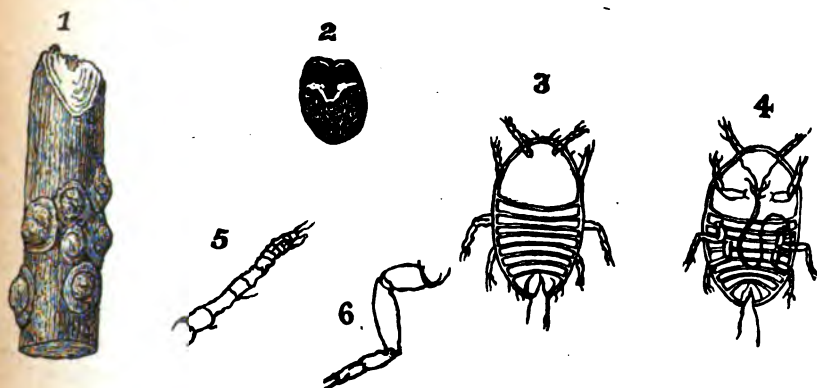
Since the date above given I have received these insects, through the several editors of our excellent bee papers, from many of the States, especially those bordering the Ohio River. In Tennessee they seem very common, as they are often noticed in abundance on the fine stately tulip trees of that goodly State. In the South this tulip tree is called the pop-

lar, which is very incorrect, as it is in no way related to the latter. The poplar belongs to the willow family; the tulip to the magnolia, which families are wide apart.

Wherever the tulip-tree lice have been observed, sucking the sap and vitality from the trees—there the bees have also been seen, lapping up a sweet juicy exudation, which is secreted by the lice. In 1870 I observed that our tulip trees were alive with bees and wasps, even as late as August, though the trees are in blossom only in June. Examination showed that the exuding sweets from these lice were what attracted the bees. This was observed with some anxiety, as the secretion gives off a very nauseating odor.

The oozing secretions from this and other lice, not only of the bark-louse family (Coccidæ), but of the plant-louse family (Aphidæ), are often referred to as honey-dew. Would it not be better to speak of these as insect secretions, and reserve the name honey-dew for sweet secretions from plants, other than those which come from the flowers?

The fact that this insect is yet undescribed—that it attacks one of our best honey trees, and is the source of a so-called honey-dew, leads me to append the following description, with illustrations.



NATURAL HISTORY OF THE *LECANIUM TULIPIPERÆ*.

The fully developed insect, like all bark-lice, is in the form of a scale (fig. 1), closely applied to the limb or twig on which it works. This insect, like most of its genus, is brown, very convex above (fig. 1), and concave beneath (fig. 2). On the under side is a cotton-like secretion,

common to all of the genus *Lecanium*, which serves to enfold the eggs. Underneath the species in question are two transverse parallel lines of this white down (fig. 2) ; one of them, probably the anterior, is nearly marginal, and is interrupted in the middle ; while the other is nearly central, and in place of the interruption at the middle it has a V-shaped projection back or away from the other line. The form of the scale is quadrangular, and not unlike that of a turtle (fig. 1). When fully developed it is a little more than 3-16 of an inch long, and a little more than $\frac{3}{4}$ as wide.

Here at Lansing, the small, yellow, oval eggs appear late in August. In Tennessee they would be found under the scales in their cotton wrappings many days earlier. The eggs are 1-40 of an inch long, and 1-65 of an inch wide. These eggs, which are very numerous, hatch in the locality of their development, and the young or larval lice, quite in contrast with their dried, inert, motionless parents, are spry and active. They are oval (figs. 3 and 4), yellow, and 1-23 of an inch long and 1-40 of an inch wide. The eyes, antennæ (fig. 5) and legs (fig. 6) are plainly visible when magnified 30 or 40 diameters. The 9-jointed abdomen is deeply emarginate, or cut into posteriorly (fig. 3), and on each side of this slit is a projecting stylet or hair (figs. 3 and 4), while from between the eyes, on the under side of the head, extends the long recurved beak (fig. 4). The larvæ soon leave the scales, crawl about the tree, and finally fasten by inserting their long slender beaks, when they so pump up the sap that they grow with surprising rapidity. In a few weeks their legs and antennæ disappear and the scale-like form is assumed. In the following summer the scale is full-formed and the eggs are developed. Soon the scale, which is but the carcass of the once active louse, drops from the tree, and the work of destruction is left to the young lice, a responsibility which they seem quite ready to assume.

In my observations I have detected no males. Judging from others of the bark-lice, these probably possess wings, and will never assume the scale form, though Prof. P. R. Uhler writes me that some of the males are apterous. He says that it is very important to know and record the males, and that the genera are hardly determined without them.

REMEDIES.

If valued shade or honey trees are attacked by these insatiate destroyers, they could probably be saved by discrete pruning—cutting off

the infected branches before serious injury was done, or by syringing the trees with a solution of whale oil soap,—or even common soft soap would do—just as the young lice are leaving the scales. It would be still better to have the solution hot. Whitman's Fountain Pump is admirable for making such applications.

Fig. 1 is slightly magnified ; the others are largely magnified. The drawings were made from the objects by W. S. Holdsworth, a senior of the Michigan Agricultural College.

DESCRIPTION OF TWO NEW SPECIES OF CATOCALA.

BY A. R. GROTE, BUFFALO, N. Y.

Catocala Beaniana, n. s.

Intermediate between *Briseis* and *Meskei*. Fore wings paler than *Briseis*, with the t. p. line more dentate, and the brown subterminal shade paler ; sub-reniform open. Hind wings red like *Meskei*, the middle black band broader, interrupted, transverse and not like *Briseis*, where it is still broader, continued and rounded, not so straight across the wing. Beneath much like *Briseis*, with the black bands broader and the white interspaces narrower than in *Meskei*. The subterminal white dentate shade on the primaries above more dentate than in *Briseis*. This species is similarly sized with *Briseis*, and is best described comparatively with that species and *Meskei*. Sent me by Mr. Thomas E. Bean, under the number 574, from Illinois.

Catocala Westcottii, n. s.

♂ ♀. Allied to *anna*, but smaller, with pale yellow hind wings and continuous bands, the median band angulated inferiorly and not so constricted superiorly as in that species. The primaries closely resemble *anna* in markings ; the black outer shade of the t. a. line is quite similar and approaches *anna* and *Westcottii* to the group of *nuptialis*, *abbreviatella* and *Whitneyi*. Beneath the pale yellow outer interspace is narrower in *Westcottii*, and there is no basal black ray on secondaries, which show the

black reniform mark on the disc as in *anna*. The mesial black band is subcontinuous and proportionately broader in *Westcottii*. Above the markings of fore wings are very similar in the two species; the tone is a little darker in *Westcottii*. The female expands 50, the male 43 mil. I have the male from Illinois, Mr. Bean, number 577; the female from Wisconsin, Mr. O. S. Westcott, for whom I name the species.

DESCRIPTION OF TWO NEW CALIFORNIAN BUTTERFLIES.

BY THEODORE L. MEAD, NEW YORK.

Chionobas Ivallda, n. sp.

MALE—Expanse $1\frac{1}{2}$ to $2\frac{1}{2}$ inches, average $2\frac{1}{4}$ inches. Upper side of primaries fuscous, with velvety discal bar and a submarginal row of gray-ochraceous spots between the nervures. These spots are usually six in number, situated in the consecutive interspaces between the nervules, beginning with the last but one subcostal interspace, counting from the apex of the wing. The second of these spots always contains a black ocellus, pupilled with white. On the fifth interspace (last median) are usually faint indications of a fuscous dot in about one-third of the specimens examined; in one instance this dot is distinct and pupilled with white.

The ochraceous spots are not sharply defined unless very well developed; their length is not more than one-third that of the inner margin of the wing; in breadth they sometimes occupy the whole interspace, leaving only a narrow border of fuscous on the nervule, while sometimes they are almost obsolete. The spots are always truncated on a line nearly parallel to the outer margin of the fore wing, thus leaving a fuscous border.

Costa mottled with gray and fuscous.

Secondaries gray-ochraceous with a fuscous border, usually with a pupilled ocellus in the second median interspace; this is occasionally obsolete. Nervures more or less distinctly fuscous.

Under side—Primaries gray-ochraceous, the pupilled spot or spots on the upper side shown more distinctly; the costa and apex mottled pale

gray and black. A distinct fuscous band as in *Chryxus* crosses the wing ; it has a sharp tooth extending out on the upper branch of median nervule and occasionally one also in the last median interspace. Within this band is another, less distinct and often partly obsolete, but corresponding with the inner crenate band of secondaries. Near the outer margin is a border of sprinkled fuscous scales, condensed inwardly to a line which is nearer the margin than the similar one in *Chryxus*. The cell is closed by a bar of dark fuscous.

Ground color of secondaries gray with a tint of ochraceous, mottled with black ; the ocellus of the upper side is always more distinct, even when absent above it is indicated below. The usual band of secondaries is as a rule distinct, though sometimes hardly distinguishable from the other mottling of the surface ; as in *Uhleri*, the border is crenulate, quite variable as to the depth of the crenulations ; the inner border with a sinus where it crosses the median nervure, in these respects much like *Chryxus*.

FEMALE—Expanse $2\frac{1}{4}$ to $2\frac{1}{2}$ inches. Primaries ochraceous above ; the band of under side shown distinctly in fuscous, its tooth on upper branch of median nervure very noticeable ; the nervures fuscous. Costa and outer margin rather broadly bordered with grayish fuscous ; this border usually becomes obsolete near the angle of the wing, except a narrow line at the margin, which is always dark fuscous.

The two ocelli mentioned in the description of the male are always present in the female ; usually also another on either side of the lower ocellus—in that case four in all.

Secondaries as in the male.

Margins of the fore wings entire, of the hind wings slightly crenulate in the male, decidedly so in the female ; fringes fuscous cut with white.

C. Ivallda is distinguished immediately from *Chryxus* by the pale color ; there is no trace of the fulvous tint shown by most of our Western species of *Chionobas*. The color, in fact, is almost exactly that of the curious *Hipparchia Ridingsii*, which has not only the appearance, but the habits of a *Chionobas*.

C. Ivallda is here described from 39 ♂ 8 ♀, one pair of which were taken by Mr. Morrison at Summit, and the rest by myself on Free's Peak and Tallac Mountain, all three localities being within a few miles of Lake Tahoe, near the boundary line between California and Nevada. They

were taken during the latter part of July and early in August, at an elevation of nine to ten thousand feet above the sea.

This species is local and I believe extremely rare in most parts of its habitat. In a very thorough exploration of the mountain crests about Summit I found none; I camped for two days on Freel's Peak for the express purpose of hunting this species, my father assisting me in the search; although it seemed a favorable locality, but five specimens were taken, all males. On the grassy northern slope of Tallac Mountain, however, we were more successful, and by returning thither and again camping, a good series of specimens was obtained.

Chrysophanus Editha, n. sp.

Group of *Xanthoides* and *Dione*. Expands $1\frac{1}{4}$ to $1\frac{1}{2}$ inches.

Male fuscous above, narrowly edged with black along the outer margin, and with black discal bar; the usual spots show through very faintly on the upper side. Hind wings fuscous, with similar black edge, and within this a row of four or five black spots near the anal angle. The two nearest this angle are surrounded by an irregular ochraceous line. Under side of fore wings gray inclining to fuscous, cinereous on the disc, with the black spots as in allied species. Hind wings below gray-fuscous clouded with white. A rather broad band of gray-fuscous occupies the outer margin; this band is crenated inwardly and cut by a fulvous line which begins on the abdominal margin, extends out on the submedian and last branch of median nervules, thus leaving a white, black-pupilled half-ocellus at anal angle, a large gray-fuscous crescent in the next interspace, and next to this a white, black-pupilled ocellus; in this respect the present species resembles *Xanthoides* and differs from *Dione*, which has much more fulvous. At the inner edge of the gray-fuscous band the white clouding is condensed into a continuous line of broad lunules, and at the inner border of this is the row of spots always found in this genus; these spots are quite large, pale gray-fuscous, edged with black and surrounded by white; the discal bar is usually confluent with the dot within the cell, so as to form an irregular horse-shoe mark.

Fringes of all the wings composed of scales of two lengths, the upper and shorter set being nearly black, the lower ones white; sometimes the black scales are a little longer in certain places, thus making the fringe seem white cut with black.

The last branch of median nervule of hind wings prolonged into a very slight tooth ; this is more distinct in the female, being there about as in *Xanthoides* ♂.

The female differs from the male in always having at least a small fulvous or ochraceous cloud upon the disc of fore wing, and a similarly colored streak at the outer angle. The cloud upon the disc is sometimes so extended as to cover half the surface of the wing. The spots of lower surface are rather distinctly shown above. In the middle of secondaries there is often an irroration of fulvous scales and a distinct scalloped fulvous line along the outer margin, enclosing a black crescent, or double dot near anal angle and smaller dots above.

Under side like the male, but brighter, and with markings more distinct ; a fulvous tint is also seen at outer angle of primaries.

This pretty little species may be distinguished from *Xanthoides*, its nearest ally, by its smaller size, the much more convex outer margins and more rounded outer angle of primaries, the blunter tooth of secondaries, the white clouding below and the large size of all the spots.

Described from thirty-three specimens, ♂ and ♀ in about equal numbers, taken on the borders of Lake Tahoe, near Carnelian Bay, on the 26th of July. In a stay of some weeks around Lake Tahoe, during which I was constantly collecting, this species was only once met with, then appearing in considerable numbers and easily taken on the flowers of Yarrow (*Achillea millefolium*), which is already a common weed in many parts of California.

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The eighth annual meeting of the above Society was held at the residence of Mr. Wm. Saunders, on the evening of the 20th Sept., 1878. The President, W. Saunders, in the chair. Letters of apology for non-attendance were read from the following members of the Council : Jas. Fletcher, Ottawa ; J. G. Bowles, Montreal, and J. Pettit, Grimsby. The President also reported that in consequence of removal to Montreal, Mr. J. Williams had been obliged to resign the office of Secretary-Treasurer.

The report of the Montreal Branch was read by the Secretary, showing that organization to be in a prosperous condition, and the members active in the work of promoting Entomology in Canada. On behalf of the Council of the parent Society, Mr. Saunders reported a number of valuable acquisitions to the Library.

The President then read his Annual Address, after which a vote of thanks was tendered, coupled with the request that a copy be furnished for publication in the ENTOMOLOGIST.

The election of officers next took place, with the following results :— President, Wm. Saunders, London ; Vice-President, Rev. C. J. S. Bethune, Port Hope ; Secretary-Treasurer, Jas. H. Bowman, London. Council— E. B. Reed, London ; Wm. Couper, Montreal ; J. Pettit, Grimsby ; J. M. Denton, London ; Rev. R. Burnet, London ; G. J. Bowles, Montreal ; Jas. Fletcher, Ottawa, and R. V. Rogers, Kingston. Editor, W. Saunders, London. Editing Committee—Rev. C. J. S. Bethune, Port Hope ; E. B. Reed, London ; G. J. Bowles, Montreal, and Rev. R. Burnet, London. Librarian, W. E. Saunders, London. Library Committee—E. B. Reed, J. M. Denton, H. B. Bock, with the President, Librarian and Secretary-Treasurer. Auditors, Messrs. Chas. Chapman and A. Puddicombe.

Succeeding the business portion of the meeting, an interesting and instructive hour was spent in the microscopic examination of insects and plants with the aid of three excellent microscopes belonging to Messrs. Puddicombe, Denton and Saunders. Among the objects of special interest were egg clusters of *Clisiocampa sylvatica*, with mites at work destroying the eggs ; mounted specimens of the new Carpet Bug, *Anthrenus scrophulariae*, and of the parasite on the Cabbage Butterfly, *Pteromalus puparum*.

IMPORTANT ANNOUNCEMENT.

In consequence of removal, our late Secretary-Treasurer, Mr. J. Williams, was obliged to resign his office. Our correspondents will please bear in mind that in future all business communications should be addressed to his successor, Mr. Jas. H. Bowman, London, Ont.

The Canadian Entomologist.

VOL. X.

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No. 11

A NEW GALL MOTH, AND NOTES ON LARVÆ OF OTHER GALL MOTHS.

BY D. S. KELLICOTT, BUFFALO, N. Y.

There have been described, thus far, three N. American moths whose larvæ produce galls, or more or less decided enlargements of the stems of their food-plant. They are, first, *Gelechia galleolidaginis*, described by Riley, with cuts, in the First Mo. Rept. at page 173; accompanying the description is an account of six parasites. Second, *Walshia amorphilla*, described by Clemens in Proc. Ent. Soc. Phil., vol. ii., page 419; also an account of larva habits, etc., with cuts, is given in the Second Mo. Rept. at page 132. Third, *Paedisca (Euryptychia) saligneana*, described by Clemens in Proc. Ent. Soc. Phil., vol. v., page 141; an account of it also occurs in the Second Mo. Rept., page 134.

I have found *G. galleolidaginis* common at different places in Michigan and about Buffalo, N. Y. However, its enemies are so numerous of late at Buffalo that not above one-half of the galls escape, so the insect is much less common than it was a few years since. I have but few facts to add to those given in the excellent monograph of Prof. Riley cited. I find that the galls are *not* always on dwarfed specimens of the plant, and, further, the larva does *not* bore entirely through the stem and then make the plug, but cuts away the walls and inner bark, leaving the epidermis which dries and falls away after the plug is completed. These galls are of frequent occurrence on plants much branched and of full altitude; they are lower on the stem than those of the fly *Trypeta solidaginis*, or of the moth *Paedisca saligneana*, and are therefore less conspicuous. On the other hand, they are more readily found than the large, oblong gall made near the ground on the golden-rod by a fly whose name is unknown to me.

Paedisca saligneana, the mis-named gall moth, is a very common insect in the vicinity of Buffalo. The habits of the larva have not, I believe, been published. Riley in the Second Mo. Report gives reasons for concluding that it is an intruder on *G. gallæsolidaginis*. It certainly is not.

The moth begins to appear about June 20th. In a few days the minute larvae may be found penetrating the stem just above the axil of a leaf near the top of the plant; sometimes they occur in a branch. The larva cuts right across the stem and soon clears out everything but the bark. The point attacked is soon surrounded by an enlarged ring, which is an effort of the plant to strengthen its weakened stem by adding new material to the outside layers; the ring continues to increase in diameter and in length upwards. The average mature gall is two and one-half times the diameter of the stem in thickness, and four times as long as broad. During the growth of the gall there is a "window," usually near the bottom, consisting of a tubercle pierced with a round orifice which is temporarily closed by a web membrane. The tubercle is probably at the point where the larva entered the stem. The purpose of this gateway seems to be for ventilation and for ejection from time to time of the castings which accumulate at the bottom of the cavity.

The larva during the summer is dusky, during the winter dull white; it attains a length of .56 to .6 of an inch; head and cervical shield dark brown or black; on the segments are large piliferous spots arranged as follows: on first segment one in front and below the spiracle, the second has a transverse row of six, the third to twelfth each has the transverse row of six and two on the dorsum behind the row.

In the autumn, when full fed, it spins a thin lining to its house and remains all winter at the lower extremity; when spring quickens it ascends, bores near the top a round passage-way, leaving, however, an external scale of bark after the manner of *T. solidaginis*. It then spins a close white cocoon reaching up to the point of final exit. It remains a pupa about three weeks. When the time has come for the final change, the pupa, assisted by the spines on the abdominal rings, ascends the silken-lined gallery, and with the prow on its front, breaks up the door, protrudes two-thirds its length, where it remains until the moth escapes, leaving the pupa-skin to tell the tale.

The pupa is rather slender, curved like a *Cossus* chrysalis, brown, teeth on abdominal rings prominent; there is on the front a strong beak, which serves a good turn when the insect escapes.

I have met only one parasite, an ichneumon fly. It is not abundant.*

There is still another moth known to me whose habits are very similar to those of *Gelechia gallæsolidaginis* Riley. I present its history and description, and propose to call it *Gelechia gallæasterella*.

Larva—Length .4 of an inch. Color tawny, head black, cervical and anal shield composed of ragged brown patches, true legs dark, terminal joint light. Piliferous spots mostly small and round, arranged thus : first segment has one below and one in front of the spiracle, second and third one above the foot and a triangle above it, fourth to eleventh two below the spiracle and a triangle above, the bases of which make a row on the sides of the dorsum.

Pupa—Length .33 of an inch. Brown, head and thorax quite dark. The head and eyes are rather more prominent than the pupa of *gallæsolidaginis* ; it is also stouter.



Fig. 1. (x2)

Imago—Length .32, expanse .8 of an inch (average of five). Fore wings white, speckled with brown and black ; there is a brown patch occupying the costal half of the middle third ; it is darkest towards the base ; bordering the hind margin of the patch is a distinct (under a lens) dark brown line which terminates in a hook ; just behind the middle of the patch are two short, parallel, black dashes ; beyond these, in line with the apex, is a short, black, irregular mark. Cilia touched with brown, the tips quite dark. Hind wings gray ; cilia light with a tinge of yellow ; tips dark. Palpi white with brown scales on outside of second joint ; terminal joint black nearly half its length, extreme tip white. Antennae annulated with brown and white. Head white, thorax white more or less streaked with brown. Abdomen gray peppered with dark scales below, the first three segments yellow above.

Described from several bred specimens.

* There is a fourth moth which I have found at different places in Ont. and New York, whose larva produces a gall on the Willow. Its habits are almost identical with those of *saligneana*. I had its history in manuscript to accompany this paper, but when about to send it to the publisher, Prof. C. H. Fernald informed me that Prof. C. V. Riley also has it in manuscript. It will finally be published as *Grapholitha gallæsaliciana*.

Food plant, *Aster corymbosus*, on the stems of which it makes an elliptical, hollow gall, 1.25 inches in length, .48 of an inch in diameter, the diameter of the plug (fig. 2) being .08 of an inch.

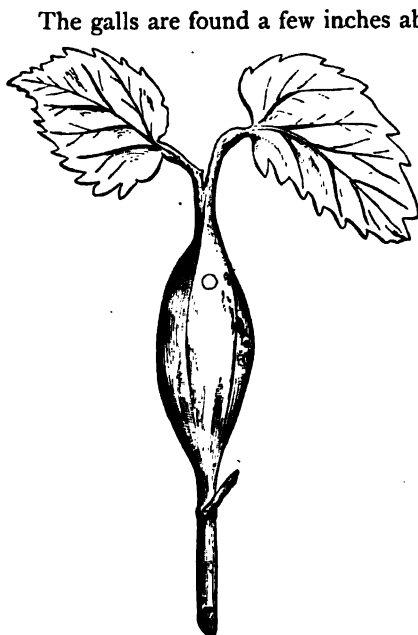


Fig. 2. Nat. Size.

The galls are found a few inches above the ground, the terminal bud developing very little after the larva begins operations. May 22nd I found full-sized galls, the inhabiting larva at the time being quite small. July 1st I discovered the first pupa which disclosed a moth, August 1st. The larva just previous to its change makes a perfectly round hole (leaving a thin scale of the epidermis) through the thin walls near the top of its house, which it fills with a closely-fitting plug of silk; on the outer border of this plug is a flange which prevents its displacement inwards, but allows the escaping moth to readily push it outwards. It then lines the interior with silk and soon changes to a chrysalis.

Twelve galls collected August 3rd contained four without parasites, while eight had an elliptical, dark cocoon suspended in the centre.

NOTES ON PAPILIO CRESPHONTES AND CATOCALÆ.

BY G. H. FRENCH, CARBONDALE, ILL.

This season I have seen some peculiarities in rearing *Papilio cressphontes* that seem worth noting. I had at one time four of the larvæ in a cage of three different broods. The two older ones changed to chrysalids June 29th; one from the top of the box with the head down, number two

on the side with head up. Number three pupated July 11th, on the side of the box, head up; number four changed July 14th, suspended from the top the same as number one, all of them at an angle with the object to which they were attached, as is usual with *Papilios*. Numbers one and three produced imagines July 15th and 29th, or after a pupal period of fifteen and sixteen days respectively. August 4th, numbers two and three remained unhatched, having remained in this state thirty-six and twenty-four days, and they presented no indications of hatching. At this time I turned the box on its side, so that the heads were suspended downward instead of pointing upward. August 7th both produced perfect imagines.

Among my captures of *Catocalæ* this season in this vicinity, are *C. marmorata* Edw., *C. sappho* Streck., and *C. delilah* Streck., on white oak trees, the last June 29th, the second July 18th and 19th, and the first September 7th.

DESCRIPTIONS OF NEW ICHNEUMONIDÆ.

BY E. T. CRESSON, PHILADELPHIA, PA.

Genus MESOSTENUS Grav.

MESOSTENUS NUBILIPENNIS.—♀. Black; anterior orbits, lower part of cheeks, spot on middle of face, most of clypeus and labrum, spot on mandibles, annulus on antennæ, line on sides of collar, spot on each side of prothorax above, spot on disk of mesothorax, most of scutellum, dot on post-scutellum, tegulæ, spot beneath, spot on sides of pleura, spot on each side behind posterior wing, two elongate marks on metathorax behind covering the prominent, obtuse and transversely compressed tubercles, the four anterior coxæ, spot on posterior pair above, annulus at base of posterior tibiæ, extreme base and apex of the first joint of posterior tarsi, the second, third and fourth joints entirely, and the apical margin of segments 1-6 of abdomen, all white; front unarmed; thorax opaque; mesothorax confluent punctured; metathorax reticulated; wings hyaline, with a fuliginous cloud beneath stigma, areolet quadrate, closed; legs fulvous, extreme tips of posterior femora, their tibiæ except white annulus near

base, most of basal joint of their tarsi, and the apical joint, black ; abdomen fusiform, rather shining, punctured, first segment considerably dilated at apex ; ovipositor shorter than abdomen. Length .30 inch.

Hab.—Georgia (Morrison). Very much like *albomaculatus* Cress., but readily distinguished by the fuliginous cloud on anterior wings.

MESOSTENUS CANDIDUS.—♂. Black ; orbits, face, clypeus, labrum, palpi, line on collar, spots on each side of prothorax above, two lines on mesothorax, scutellum, spot on post-scutellum, tegulæ, spot beneath, transverse line on sides of pleura, short line or spot beneath, curved spot behind each posterior wing, four spots on metathorax posteriorly, arranged in a transverse line, those on posterior face covering the short obtuse tubercles, four anterior coxæ and trochanters, base above and apex beneath of posterior coxæ, their tarsi except base and extreme tips, base and apex of first abdominal segment, and apical margin of second and following segments, all white ; front unarmed ; antennæ entirely black ; mesothorax confluent punctured, without distinct impressed lines ; metathorax reticulated ; wings hyaline, with an æneous gloss, areolet open ; legs fulvous, base beneath and apex above of posterior coxæ, extreme tips of their femora, their tibiæ except base, and extreme base and apex of their tarsi, black ; abdomen slender, smooth and polished, first segment slightly dilated at tip, the second much narrowed to base. Length .30 inch.

Hab.—New York (Comstock).

MESOSTENUS FORTIS.—♀. Black ; orbits, face except two spots above clypeus, clypeus, labrum, spot on mandibles, palpi, broad annulus on antennæ, line on collar, spot on each side of prothorax above, two lines on mesothorax, scutellum, spot on each side before on basal ridge, post-scutellum, tegulæ, dot beneath, longitudinal line on sides of pleura nearly confluent with a short curved line posteriorly and beneath, a line before each intermediate coxa, spot behind posterior wing, two spots on posterior face of metathorax covering the short blunt tubercles, a round spot on each flank, all the coxæ except tips of posterior pair above, four anterior trochanters, base of first abdominal segment, and narrow apical margin of all the segments above, all white ; front unarmed ; antennæ thickened beyond the middle ; mesothorax without distinct impressed lines, sparsely punctured, longitudinally striated on disk ; wings hyaline,

slightly dusky at tips, areolet open ; legs pale fulvous, tarsi paler, apex of posterior coxæ above black ; abdomen fusiform, shining, impunctured, first segment gradually dilated at tip ; ovipositor as long as the abdomen. Length .45 inch.

Hab.—New York (Comstock). This may prove to be the ♀ of *candidus*.

MESOSTENUS DILIGENS.—♀. Black ; orbits, very broad on cheeks beneath, face except medial spot, clypeus, base of mandibles, palpi, broad annulus on antennæ, collar, large spot on each side of prothorax above, two lines on mesothorax, scutellum, short oblique line on each side anteriorly, spot on post-scutellum, tegulæ, spot beneath, large spot behind each posterior wing, small one beneath, large oblique line on sides of pleura confluent with mark in front of intermediate coxæ, flanks of meta-thorax, two large sub-cuneiform marks on posterior face covering the short blunt tubercles, four anterior coxæ, first abdominal segment except black spot above near tip, spot on each basal corner of second segment, and broad apical margin of segments 2–6, all white ; front unarmed ; mesothorax with indistinct impressed lines ; wings hyaline, areolet open ; legs pale fulvous, tarsi paler, extreme tips dusky, posterior coxæ with white spot above ; abdomen fusiform, impunctured, first segment rather broadly dilated at tip ; ovipositor shorter than abdomen. Length .32 inch.

Hab.—Illinois (Lewis).

MESOSTENUS AUDAX.—♀. Black ; orbits, broad on cheeks beneath, sides and middle of face, most of clypeus, spot on mandibles, palpi, broad annulus on antennæ, line on collar, spot on each side of prothorax above, two short lines on disk of mesothorax, scutellum, spot on post-scutellum, tegulæ, spot beneath, oblique line on sides of pleura, smaller one immediately beneath, spot behind posterior wing, round spot on flanks of meta-thorax and two spots on posterior face covering the short blunt tubercles, all white or yellowish-white ; front unarmed ; mesothorax confluent punctured, with indistinct impressed lines ; metathorax rather coarsely reticulated ; wings hyaline, faintly yellowish, areolet open ; legs fulvous-yellow ; coxæ dull whitish, posterior pair tinged with fulvous, tarsi pale yellow, extreme tips dusky ; abdomen fusiform, impunctured, first segment and apical and lateral margins of remaining segments, dull whitish, sometimes more or less tinged with fulvous, especially the disk of post-petiole,

which is rather broadly dilated ; ovipositor shorter than the abdomen. Length .55 inch.

Hab.—Georgia (Ridings).

MESOSTENUS EXAPTUS.—♀. Black ; head and thorax marked exactly as in *audax* ; front unarmed ; mesothorax rather sparsely punctured, the two impressed lines distinct only in front ; metathorax reticulated, broad and flat on posterior face, sub-pubescent ; the tubercles short and obtuse ; antennæ robust toward tips ; wings hyaline, slightly dusky at tips, areolet open ; legs fulvous-yellow, anterior coxæ and trochanters whitish, tarsi yellowish ; abdomen fusiform, shining, impunctured, apical margin of the segments narrowly whitish, the first segment, and anterior margin of the yellowish band on second segment, fulvous, post-petiole rather broadly dilated ; ovipositor a little longer than the abdomen. Length .32 inch.

Hab.—Massachusetts (Ridings).

MESOSTENUS SAUNDERSI.—♀. Black, shining ; anterior orbits interrupted on sides of face, short line on posterior orbits, spot on clypeus, palpi, annulus on antennæ, spot on scutellum, dot behind, the short blunt tubercles on metathorax, tegulæ, and dot beneath, all yellowish-white ; mesothorax sparsely punctured, without impressed lines ; metathorax broad, reticulated, flat on posterior face ; sides of pleura longitudinally excavated, polished ; wings hyaline, faintly dusky at tips ; areolet open ; legs fulvous, posterior tibiæ dusky at tips, tarsi pale yellowish, fuscous at extreme tips ; abdomen fusiform, shining, impunctured ; the first segment entirely, and broad apical margin of second segment, fulvo-ferruginous, apical margin of remaining segments narrowly whitish, interrupted on disk of third segment ; post-petiole rather broadly dilated ; ovipositor as long as the abdomen. Length .40 inch.

Hab.—Canada West (Mr. Wm. Saunders). In this species the head and thorax are almost entirely black.

MESOSTENUS LATICINCTUS.—♀. Black, opaque ; broad orbits, face, clypeus, mandibles except tips, palpi, broad annulus on antennæ, collar, broad line on each side of prothorax above, spot on disk of mesothorax, scutellum, large mark on each side behind posterior wings, spot beneath them, flanks of metathorax, two elongate marks on posterior face covering the prominent transversely compressed obtuse tubercles, tegulæ, dot

beneath, broad oblique mark on sides of pleura, confluent behind with a large mark covering almost entirely the under surface, four anterior coxæ and trochanters, and broad band at tip of abdominal segments, all white; front unarmed; antennæ long, sub-robust at tip; mesothorax very finely and densely punctured, metathorax more coarsely so; wings sub-hyaline areolet open; legs fulvous-yellow, posterior coxæ with base beneath and apex above black, posterior tarsi yellow, fuscous at extreme tips; abdomen sub-fusiform, the base and apex shining, post-petiole gradually dilated; ovipositor about half the length of the abdomen. Length .35 inch.

Hab.—Louisiana (Lewis).

MESOSTENUS PROMPTUS.—♂. Black; anterior orbits broad on sides of face, clypeus, mandibles except tips, palpi, spot on each side of prothorax above, lateral carinae at base of scutellum, tegulae, four anterior coxæ and trochanters beneath, and posterior tarsi except base and apex, white; sometimes the middle of the face is more or less white; antennæ entirely black, slender at tips; front unarmed; mesothorax shining, sparsely punctured, the two longitudinal lines deeply impressed, the middle lobe prominent; metathorax with lateral carinae of posterior face sharply defined, but without prominent tubercles or spines; wings sub-hyaline, areolet sub-quadrate, closed; femora fulvo-ferruginous, four anterior tibiae and tarsi yellow; abdomen slender, sub-compressed at tip, fulvo-ferruginous, the three or four apical segments black. Length .35 inch.

Hab.—Canada (Pettit); Illinois (Lewis).

MESOSTENUS AMERICANUS.—♀. Black, shining; short line on upper anterior orbits, palpi obscurely, annulus on antennæ, interrupted beneath, obscure line on each side of scutellum at base, and dot on tegulae, whitish; front unarmed; mesothorax with well impressed lines; metathorax rather coarsely sculptured, with a smooth polished space on each side at base, sides of posterior face with sharply defined carina, but without prominent tubercles or spines; wings sub-hyaline, areolet longitudinally sub-quadrate, closed; four anterior legs, except coxæ and trochanters, and posterior femora ferruginous, posterior tibiae and tarsi fuscous, joints 2-4 of the latter occasionally more or less pale; abdomen narrow fusiform, shining, impunctured, ferruginous, apical segments sometimes dusky, first segment long, slender, apical third rather suddenly dilated and sub-quadrate; ovipositor as long as the abdomen. Length .30-.33 inch.

Hab.—Maine (Fernald); Virginia (Ridings). This has much the appearance of a small specimen of *Cryptus americanus* Cress.

MESOSTENUS MACILENTUS.—♂. Black; orbits broad on cheeks, clypeus, base of mandibles, palpi, line on collar, upper margin of prothorax interrupted medially, spot on disk of mesothorax, scutellum, spot behind each posterior wing, line on flanks of metathorax, two spots at tip above, tegulae, spot beneath, two spots on sides of pleura, the anterior one the largest (both sometimes wanting), and spot at base of all the coxae, all white; front unarmed; antennae entirely black; mesothorax prominently trilobed; metathorax unarmed, pubescent; wings more or less dusky, areolet minutely quadrate, closed; legs long and slender, fulvo-ferruginous, black line at base of posterior femora within, their tibiae and tarsi more or less dusky, the second and third joints of the latter more or less pale; abdomen long, slender, ferruginous, apical segments sometimes obfuscated; first segment long, linear, stigmata prominent. Length .40 inch.

Hab.—Illinois, Louisiana (Lewis); Texas (Heiligbrodt).

NOTES ON SEVERAL SPECIES OF COLEOPTERA, WITH SOME ACCOUNT OF HABITS, ETC.

BY CHARLES DURY, AVONDALE, HAM. CO., OHIO.

Meglodacne Ulkei Crotch.

This pretty and interesting species, described by Mr. G. R. Crotch from a single specimen in the collection of Prof. Ulke, of Washington, D. C., who received it from Kentucky ten years ago, has remained unique in his collection until I found it, together with its larvæ and pupa.

Its food is fungus (*Polypora*) growing on logs. Its full-fed larvæ are $\frac{3}{8}$ inch long, rather slender, of light color, with the head brown; it eats out a cavity in the fungus, and there transforms to a pupa, which is of a pale flesh color. When the beetle first hatches from the pupa it is of a very light pinkish color, without any markings whatever. When it hardens i

acquires the black spots and the deep red color, with which its elytra are ornamented. A species of brown ant appears to prey on it, as I saw several larvæ and soft imagines being dragged away by these ants. The habits of the adult differ somewhat from *M. heros* and *fasciata*, in that *Meg. Ulkei* lives more inside the fungus and is less inclined to drop to the ground when the fungus is jarred.

Habitat—Campbell Co., Ky. ; July, 1878.

Bothrideres (Machlotes) exavatus Mels., and *gemminatus* Say.

These two species were found under and in the bark of an old elm tree, and were from the ground up 26 feet. They vary much in size. The larva constructs a very curious semi-transparent cocoon, flat on one side and convex on the other, and generally several joined together in a cluster. On emerging the imago is very light, but soon hardens and gets quite dark-brown colored.

Campbell Co., Ky. ; July, 1878.

Omophron robustum Horn.

This species is described by Dr. Horn from specimens from Nova Scotia, and I believe Mr. Shwartz took a specimen or specimens on Lake Superior. In company with *Om. americanum* Dej. and *tessellatum* Say *robustum* was secured. While these species preferred sloping sandy banks near the water, many were taken on mud banks. On deluging the bank with water, it was amusing to see them rush out and up the bank.

Ham Co., Ohio ; July, 1878.

A FEW HINTS ON COLLECTING LARVÆ OF DARAPSA VERSICOLOR.

BY ROBERT BUNKER, ROCHESTER, N. Y.

For several years past I have searched carefully for larvæ of this species, only to be rewarded with damaged wardrobe and wet feet. This season I determined to try the plan of breaking off the button-bush branches and shaking them over paper spread on the ground. On my

first trial I secured one nearly full-grown larva of *versicolor*, and six half-grown larvæ of *promethea*. Unfortunately I was unable to visit the bushes again until it was too late. The advantages this method has over that of examining the bushes while standing are manifold. In the first place, four times as many branches can be examined in the same length of time. Secondly, not a larva, great or small, can escape observation. Last, and not least, eggs may be detected, because, as is well known, insects generally lay their eggs on the under side of the leaf or on the stem. Another advantage to the collector is that the wood of this shrub is very brittle, and fifty branches can be broken off in a few minutes.

I observed one characteristic not mentioned by Geo. D. Hulst in his description of *D. versicolor*. In moving from one branch to another it feels its way step by step, stretching out the thoracic part of its body three times its ordinary length, and then suddenly drawing back, repeating the same several times before venturing forward, reminding me strongly of the manœuvring of a large tropical basket-worm I once had the pleasure of rearing. As many of the branches of the button-bush hang directly over the water, the larva seems to know by instinct that a fall would be fatal, and no doubt (as Mr. H. Strecker has suggested) many of them are lost in this way.

A REMARKABLE ENTOMOLOGICAL COLLECTION.—Some details have reached us concerning a large collection in Entomology made by Henry Edwards, of San Francisco, during the last 25 years. Professor Davidson, President of the Academy of Sciences, states that this collection of insects is one of the largest ever made in the United States, and by far the most complete ever made on the Pacific coast. It consists of about 60,000 species, comprising more than 200,000 specimens. These include not only all the orders on the Pacific coast, but nearly or quite all in the United States, with a large representation of orders from all parts of the world. The collection is said to be really one of the most complete known in any country. It is valued at \$12,000, or rather, that is about the sum expended in freights, cabinets and the purchase of rare specimens. The labor of 25 years is not estimated.—*Times* (London, Eng.)

INSECTS OF THE NORTHERN PARTS OF BRITISH AMERICA.

COMPILED BY REV. C. J. S. BETHUNE, M. A.

From Kirby's Fauna Boreali-Americana : Insecta.

(Continued from Vol. x., p. 139.)

FAMILY ACANTHIADÆ.

389. *ARADUS TUBERCULIFER* Kirby.—Plate vi., fig. 5. Length of body $3\frac{3}{4}$ lines. A single specimen taken with preceding.

[279.] Body dull black, very flat. Head with the nose prominent and obtuse, and the front armed with a sharp tooth on each side; antennae black with the second joint rufous all but the tip; the last joint white at the tip; prothorax with a short anterior truncated lobe, widest in the middle where the sides form a rounded angle; emarginate posteriorly; edge very minutely serrulate; six longitudinal ridges occupy the disk of the thorax, the two external ones are abbreviated and rather obtuse; scutellum with a reflexed margin, and bearing on its disk a large subhemispherical tubercle; hemelytra reticulated with cinereous, especially the membrane; abdomen with a broad margin, and the last segment bilobed with incurved lobes.

This species appears to be related to *A. depressus* and *elevatus* Fabr., and to *A. quadrilineatus* of Say.

390. *ARADUS AFFINIS* Kirby.—Length of body $2\frac{1}{2}$ lines. Several taken with preceding.

Extremely similar to *A. tuberculifer*, but much smaller. Antennae entirely black; prothorax not extended anteriorly, so as to form a lobe; lateral abbreviated ridge more obtuse, resembling a tubercle; margin of the abdomen with a white point at the apex of each segment; anus not lobed.

FAMILY REDUVIADÆ.

[280.] 391. *REDUVIOLUS INSCRIPTUS* Kirby.—Plate vi., fig. 7.—Length of body 3 lines. A single specimen taken with preceding.

Body of a pale or yellowish white, lineari-oblong, widest posteriorly. Antennae shorter than the body, rufous, three last joints very slender;

head and prothorax streaked and dotted with black ; with the anterior lobe of the latter constricted next the head, separated from the posterior by an impressed sinuated black line ; scutellum black with two pale longitudinal elevations, thickest anteriorly ; hemelytra with the nervures whiter than the rest of their substance ; with three blackish discoidal dots arranged longitudinally from the middle to the membrane ; thighs dotted with black, the anterior pair being incrassated and thicker than the intermediate, and these than the posterior, which are not incrassated ; back of the abdomen black, with a white lateral margin, underneath with three longitudinal black stripes.

[281.] 392. *CHIROLEPTES RAPTOR Kirby*.—Length of body nearly 4 lines. Two specimens taken in the road from New York to Cumberland-House.

Body black and shining. Head subrhomboidal, connected with the prothorax by a long cylindrical and transversely wrinkled neck, which altogether gives the animal a serpentine aspect ; legs pale ; shoulders much incrassated, blackish at the tip, armed below with several strong spines ; cubits with a single intermediate one ; prothorax bell-shaped, black, dull from inconspicuous pubescence ; scutellum dull, white at the tip ; hemelytra dull from pubescence, blackish-brown, with paler lines which extend into the membrane ; lateral margin white ; abdomen black, with the ventral lateral margin white.

This species approaches very near to Say's *Reduvius raptorius*, but it is distinct.

[282.] 393. *NABICULA SUBCOLEOPTRATA Kirby*.—Length of body 4 lines. Taken with the preceding.

Body apterous, black, without any gloss. Head subtriangular, antennæ rufous ; thorax bilobed, first lobe thrice as long as the last, bell-shaped ; last a little wider than the first, flattish ; hemelytra a little shorter than the abdomen, brownish-black, punctured ; lateral margin obscurely rufous ; membrane scarcely differing in substance or colour from the rest of the hemelytrum ; legs rufous ? abdomen obtusangular underneath.

FAMILY HYDROMETRIDÆ.

394. *GERRIS RUFO-SCUTELLATA Latr.*—Length of body $6\frac{2}{3}$ lines. One specimen taken in Lat. 65° .

Body underneath black, covered with silver pile. Head brown-black, subpilose; two first joints of the promusci black and robust, the remainder rufous and more slender; antennae rufous with the last joint black; eyes large, subhemispherical, brown; prothorax dull-ferruginous, with the lateral margin, a dorsal subelevated line, and the scutellum, paler; legs rufous, pale at the base; hemelytra dull-ferruginous, with the lateral margin and nervures black; the bead that forms the lateral margin of the abdomen, and the two last segments, are rufous; the anal spines are very little shorter than the tail.

[283.] 395. *GERRIS LACUSTRIS* Linn.—There were three pupæ of this species taken, which do not appear to differ from the European specimens.

FAMILY CORIXIDÆ.

396. *CORIXA STRIATA* Linn.—Length of body 3—3¼ lines. Many specimens taken with the preceding.

Body yellowish; depressed, naked, smooth. Head inflexed, obtuse; eyes brownish, triangular; antennae inserted before the eyes under the lateral margin; scape incrassated; remaining joints together are setiform; prothorax subtriangular, with the hemelytra, brown, streaked transversely, with irregular yellow streaks; epipleura not streaked, pale-yellow; breast black, spotted with yellow on the sides; legs yellow; anterior and posterior tarsi natatory; the latter longer than the tibiae; abdomen with the first ventral segment, and an abbreviated basilar band of the second, black.

VARIETY B. With the first joint of the posterior tarsi black at the tip. This may be a distinct species; there were seven specimens distinguished by a black annulet surrounding the terminal half of the first dilated joint of the tarsus in question.

[284.] 397. *CORIXA CARINATA* Kirby.—Length of body 4 lines. Two specimens taken with preceding species.

Body yellow underneath, embrowned at the insertion of the legs. Head yellow; front broad and flat; labrum transversely tricarinate; occiput obtusangular; vertex with an obsolete longitudinal ridge issuing from the

angle of the occiput ; prothorax with a longitudinal intermediate ridge, transversely streaked with yellow and brownish black ; hemelytra sprinkled, and towards the base almost streaked, with black and yellow. In other respects this species resembles *C. striata*.

398. *CORIXA PLANIFRONS Kirby*.—Length of body 4 lines. Two specimens taken with the preceding.

This species differs from the preceding in having the under side of the body black, with two pale spots on each side of the breast, and the anal half of the abdomen pale-yellow. The head is yellow, the vertex is ridged longitudinally and separated from the front by a transverse curvilinear ridge ; and from which the anterior part of the face is inflexed, plane or slightly concave ; in other respects this species exhibits exactly the same characters with *C. carinata*. They may perhaps be sexual varieties.

[285.] FAMILY NOTONECTIDÆ.

399. *NOTONECTA INSULATA Kirby*.—Length of body $6\frac{3}{4}$ lines. A single specimen taken.

Body underneath black, above yellowish. Head yellowish, with a brownish longitudinal stripe between the eyes, which are reddish ; scutellum very black, velvety ; hemelytra with the lateral margin brown spotted with yellow ; the posterior half of the hemelytra is brown anteriorly, black-brown in the middle, fuliginous at the apex ; in this darkened portion anteriorly is a yellowish triangle connected with the last marginal spot, and posteriorly is a white kidney-shaped spot followed by the sooty apex ; breast very hairy with longish fuliginous hairs ; legs yellowish.

VII. HOMOPTERA.

FAMILY CERCOPIDÆ.

400. *CERCOPIS MARGINELLA Fabr.*—Length of body $3\frac{1}{4}$ lines. Taken with the preceding, and at Carlton-house in April.

Body black, dotted and inscribed with white. Hemelytra embrowned ; nervures black ; lateral margin sanguine ; margin of the abdomen edged with white.

[286.] VIII. LEPIDOPTERA.

FAMILY PAPILIONIDAE.

401. *PAPILIO TURNUS* Linn.—Taken in Canada by Dr. Bigsby. [It is, of course, quite unnecessary to repeat Kirby's description of this very familiar butterfly.]

[287.] 402. *COLIAS EDUSA* Fabr.—Several specimens from North America. [This species is, no doubt, *C. eurytheme* Boisd., which is quite common at Sault Ste. Marie and other localities in the North-west. For description and admirable figures see Edwards' "Butterflies of North America," vol. i., part iv.]

PERSONAL.—Our esteemed friend, J. Pettit, Esq., has removed from Grimsby, Ontario, to Buffalo, New York. Correspondents when writing him will please bear in mind this change of address.

CORRESPONDENCE.

A CHEAP ENTOMOLOGICAL CABINET.

DEAR SIR,—

I have recently been looking over the back volumes of the ENTOMOLOGIST, and have found them, as I do the later numbers, very interesting and instructive reading. Among other valuable items, I have noticed suggestions regarding the construction of cheap cases for holding specimens, and as the question of expense is always an important one, especially to young collectors, I will, if you can spare me space, briefly describe the style of cabinet I am now using, and which has been adopted by one of my friends.

Among the substitutes for cork mentioned by Packard (in his Guide to the Study of Insects) are thin frames covered on each side with paper

and fitted into the bottom of drawers in a cabinet. Now I have gone a step farther, and discarding the drawers entirely, have adopted the frames and adapted them to a cabinet without drawers. This cabinet can be made of any size and be divided by upright partitions to suit the taste of the owner, and the frames can run in grooves made in the sides and partitions before it is put together, or between movable strips tacked or screwed in afterward at suitable distances, say two inches. The one I now use (a small one made as an experiment) is three feet two inches wide inside, with two partitions, so that there are three spaces each one foot in width. It is fifteen inches deep and two feet high. Placing the frames two inches apart gives me twelve in each section, or thirty-six in all, and as each has a surface of twelve by fifteen inches, I have an aggregate expanse of thirty-six square feet. The advantages claimed for this cabinet are its lesser weight and expense. It is easily handled and can stand pretty rough usage without fear of damaging specimens, as the pins are firmly held, and the frames, running in grooves or between strips, cannot stir when the door shuts close against them. It does away with the expense of drawers, the cork alone for which (thirty-six feet at 18 cents per foot) would be \$6.48. The frames constructed of thin stuff (say quarter-inch) cost at the most five cents each, and suitable stiff cartridge paper is very cheap. If the frames are made slightly smaller than those mentioned, one sheet will cover both sides of two frames. The paper is put on when damp, but should not be too wet. The frames can be easily re-papered if needful, and if the sections are made of equal width, they will all be interchangeable, which will be found a great convenience.

This manner of keeping specimens will, I think, be particularly useful to collectors of Coleoptera. I send this, feeling that each member of the Society should contribute his mite of experience and knowledge for the benefit of his fellow-workers.

W. H. HARRINGTON, Ottawa, Ont.

THE TOMATO-WORM (*Sphinx quinque-maculata*).

DEAR SIR,—

This insect has been extraordinarily abundant this year in the neighborhood of Port Hope, so much so that many persons had to take vigorous

measures for the preservation of their crop. On the few plants in my own garden scores of the larvæ were found. A market-gardener who lives close by me—Mr. Wm. Eddie—informs me that on one day during the summer he and his assistants together gathered *four bushels* of the “worms” off an acre and a quarter of tomatoes! During many days following they seemed almost as numerous as ever, in spite of continuous hand-picking. Yesterday (Oct. 18) Mr. Eddie brought me a newly escaped imago. Is not this autumnal appearance most unusual? I suppose that it may be attributed to the long continuance of warm weather; up to to-day nothing has yet been touched by frost in my garden.

C. J. S. BETHUNE, Port Hope, Ont.

ON *L. LUCIA* AND *PSEUDARGIOLUS*.

DEAR SIR,—

In the absence of all knowledge of the preparatory stages of *Lycaena Lucia*, the date of the first appearance of this species and *L. pseudargiolus* var. *neglecta*, at this place the present season, are not favorable to Mr. Edwards' view of their being one and the same thing. One male example of *Lucia* was found on April 4th. On the 8th several appeared, two males taken. On the 12th males common, one female taken. On the 19th several pairs taken copulating; many observed. A male *neglecta* taken, apparently just emerged. On 22nd both sexes of *Lucia* common; males worn; several male *neglectas* abroad. On April 30th and May 4th females of *Lucia* observed depositing eggs on flower buds of *Cornus Florida*. May 9th, female *neglectas* abroad, both sexes of which have been observed up to July 10th. The last *Lucia* was observed May 9th. The above observations were carefully and conscientiously made. If, in the end, it shall be proved that *Lucia* is an early spring form of *pseudargiolus*, the above is almost conclusive evidence that deep coloration is not wholly the result of frigid weather.

NOTE.—It is with trepid hand that I pen the fact that two species of *Rhopalocera*, believed by some of our boreal friends to exist no where in this State outside of famous Center—*N. canthus* and *A. vialis*—are frequently met with in this section.

E. C. HOWE, M. D., Yonkers, N. Y.

DEAR SIR,—

The cutting sound heard by Dr. Packard, and discovered to be two black points used by the insect to cut its way out of prison, is not confined to *Luna*. I have heard the same sound when *Polyphemus* was about to leave its wintry mansion, but supposed it was done by the moth working its feet against the softened part of the cocoon. The feet and legs seem as strong when the insect first emerges as they do any time afterwards; indeed it is surprising, after the exhaustive effort the insect must have made to get through the tough cocoon, to see how readily it crawls up to a convenient place for its ample wings to spread into shape and beauty. As all breeders of moths are aware, the wings, when the moth first comes out, are soft and weak, and are the last parts we should suppose would assist in the arduous task.

On two occasions I have heard a sharp report when *Cecropia* was about to make its exit from the cocoon. The sound was similar to that produced by toy torpedoes such as boys amuse themselves with. I have thought perhaps the corrosive liquid used by the moth to soften the silk might be of an explosive nature, and on coming in contact with the oxygen of the air, might produce the sound. I should like to know if any of the readers of the CAN. ENT. have heard this remarkable sound, and what their opinions are.

ROBERT BUNKER, Rochester, N. Y.

DEAR SIR,—

Saperda candida Fab. made their appearance this year about twenty days earlier than usual. Trees leafed out in this vicinity about thirty days earlier than in ordinary seasons. Took June 2nd, 3 ♂ and 1 ♀.

June 6th, I took one pair of *Saperda puncticollis* Say on poison ivy (*Rhus toxicodendron* L.)—the first of these handsome *Saperdas* taken in this locality.

June 12th, took the first *Saperda Fayi* Bland. This borer attacks the limbs and stem ($\frac{1}{2}$ to $1\frac{1}{2}$ inches in diameter) of our wild thorn (*Crataegus crus-galli* L. and *C. tomentosa* L.), creating a gall-like, gnarly swelling, weakening the branch so that it sometimes breaks off by the wind, and often killing it. The beetle cuts its way out from one to three inches above or below the swelling. In 1876 I took a ♀ *S. Fayi* Aug. 15th.

CHAS. D. ZIMMERMAN, Buffalo, N. Y.

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NOTES ON A WINTER HOLIDAY.

BY THE EDITOR.

During a recent holiday, while on a trip South, we spent a day among the Entomologists at Albany, N. Y. To say that it was a pleasant day, an *exceedingly enjoyable* day, would convey but a faint idea of the pleasures there in store for us. Arriving early in the morning, we made our way to the State Museum of Natural History, where we found three veteran Entomologists conspiring to make our brief stay a memorable one. Under the guidance of Messrs. Lintner, Meske and Hill, we were soon enraptured by the sight of the countless rarities contained in the collections of Lepidoptera made by those gentlemen in this vicinity. We have seen many collections in the course of our wanderings, but for multiplicity of species, full series of rarities and matchless perfection of individual specimens, it had never before been our pleasure to witness anything that would compare with the valued stores contained in the cabinets of these enthusiastic collectors at Albany; and without fear of contradiction, it may be said that the Entomologists resident there have contributed more towards our knowledge of the Lepidoptera native to the northern portions of America than any other equal number of collectors in the country. The enthusiasm they have long maintained and their indomitable perseverance have enabled them to overcome almost every obstacle and accumulate such wonderful series of specimens, especially by night captures at sugar, as no less favored Entomologist could look over without feelings almost akin to envy. After one had seen scores upon scores of individuals of some rare Noctuid, which in one's own collection had perhaps long been represented by a treasured fragment, the question would frequently rise as to whether *anything* in this line be rare in the neighborhood of Albany.

During the day we were also privileged to see the magnificent series of *Catocalas* in the collection of Dr. Jas. H. Bailey, and one could only regret that the day was too short to do any sort of justice to the mass of material to be inspected. After laboring busily from early morn until late at night, we parted at the railway station, carrying with us the most pleasant recollections of a day happily spent amidst old and newly-found Entomological friends.

On reaching Washington, Nov'r 23, we paid a brief visit to the Entomological rooms in the Department of Agriculture, where we had expected to find our esteemed friend, Prof. C. V. Riley, but unfortunately business had called him away from home. Through the kindness of Messrs. Pergande and Howard we were shown very many things of interest, especially in the way of insects in their earlier stages, both living in breeding cages and preserved as blown larvæ, and in this way a very pleasant and instructive hour or two was spent. We were sorry to learn from our good friend, Chas. R. Dodge, that "Field and Forest" was about to be discontinued for want of sufficient support. This valued periodical has done good service in the cause of Natural Science, awakening an interest in this direction in many minds, and we feel that in its decease we have lost a valuable aid. It gave us much pleasure to find that veteran Entomologist, Prof. T. Glover, with health almost restored, busily engaged in his Entomological work. Through the affable kindness of Dr. T. V. Hayden, we were shown through the Department of the Interior, that great national laboratory from whence has issued so many works invaluable to the naturalist in every field of labor. After lingering long among the many interesting objects which claimed our attention, we returned laden with useful works and pamphlets on subjects relating to Entomology, deeply impressed with the important work here carried on by a great and progressive nation in the interests of science; and with very pleasant recollections of the great personal kindness shown us by the worthy and distinguished head of this most useful branch of the national service.

The Smithsonian Institution was also visited, with its immense collections and innumerable objects of interest, and through the kindness and liberality of the Secretary, some recent and valuable works on Entomology and kindred subjects were secured for our Society's library.

Passing through Virginia, the Carolinas and Georgia, we landed in Fernandina, Florida, with its historic surroundings, on the 30th day of November, where we found everything assuming a tropical aspect—the

landscape dotted with Palms, Orange trees, Magnolias, Live-oaks and other evergreen trees, and the air so balmy as to at once suggest thoughts of butterfly nets and collecting bottles. Of the latter we had with us a supply, but not expecting to meet with anything on the wing, our insect nets were left folded away in their wintry home. We turned over logs and chips in search of insect life, but found very little to reward our energies. Subsequently, while wandering about in Jacksonville, we saw several butterflies on the wing, most of them new to us; we recognised that charming yellow, *Callidryas eubule* as it floated about among the beautiful roses, jessamines, poinsettas and other flowers in the gardens, and we longed for a net that we might cultivate a closer acquaintance with this and some of the other species which we were unable to determine in their flight. Our old friend, *Danais archippus*, was frequently met with, and reminded us of summer at home. Florida, however, is very poor in insects at this season of the year, but as summer approaches it is in many parts a paradise for the collector. During a week spent in this land of flowers we travelled over 800 miles along its rivers and railways, seeing much of its characteristic scenery, the most southerly point touched being Leesburgh, on Lake Griffin, a little south of the 29th degree of latitude and 300 miles south of Jacksonville by tortuous river travel. Here butterflies were more abundant, and having landed with a very pleasant party in an orange grove, amidst half a million of oranges on 2,500 large bearing trees, one was puzzled what to do first. The oranges were tempting, but the sight of beautiful specimens of *Agraulis vanilla*, *D. berenice*, with charming *Heliconias*, *Theclas*, etc., was still more overpowering, and with hat in hand, the butterflies were vigorously pursued until several specimens had been secured, but with such imperfect means of capture at hand, the beautiful insects were battered and torn, and our clothing having become covered with malignant burs collected in the chase, we thought it best under the circumstances—the first burst of enthusiasm being over—to devote our attention more particularly to the orange question.

While vigorously consuming oranges, enquiries were made as to whether the trees or fruit were subject to insect enemies. Beyond occasional specimens of the larva of *Papilio cresphontes*, we could not learn of any caterpillar which consumed the leaves, and the only insect which seemed to trouble the orange growers at all was a species of *Coccus*—*Aspidiotus citricola*—which attacks the bark and foliage of both the orange

and lemon trees, and occasionally, if very numerous, gives the tree a sickly appearance. But such an effect was rare, and one could not help feeling astonished at the luxuriant and vigorous growth of the average orange grove and the symmetry and beauty of the trees laden with their golden fruit, in soil, in most instances, so poor that one wondered where the nourishment came from. In our course up and down the Ocklawaha River, where the trees are everywhere clothed with the beautiful Florida moss, *Tillandsia usneoides*, and the swampy margins decked with brilliant asters and other composite flowers, we observed many Neuropterous insects on the wing, but did not succeed in capturing any; indeed, the catching of an insect seemed insignificant work in the midst of the excitement attendant on the shooting of alligators, herons, ducks and other large game, and at the close of the week there were very few spoils wherewith to grace the Entomological cabinet. Now, a few days later, amidst frosts and snow, the novel recollection of the recent heated butterfly chase, the cooling off under the shade of orange trees, imbibing the sweet rich juice of the fully-ripened fruit, and the additional novelty of a sun-burnt brow, all in the midst of the month of December, are things not soon to be forgotten.

ON THE PUPATION OF THE NYMPHALIDÆ.

BY W. H. EDWARDS, COALBURGH, W. VA.

In Ent. Mo. Magazine for August, 1878, is a paper by Dr. J. A. Osborne, respecting a discovery made by him of the mode by which the larvæ of the Nymphalidæ attach the chrysalis to the button of silk, and which is "altogether at variance with the account given in Kirby and Spence and other works." Dr. Osborne relates: "In watching the transformation of *V. Urtice*, I found that the chrysalis was attached to the old skin of the caterpillar by a membrane sufficiently strong and permanent to support the insect during the critical last moments of pupation, and fully explaining why it does not fall down when the tail of the chrysalis is withdrawn from the old skin and thrust up to be attached to the silk." The

author then refers to a communication made by him to *Nature*, vol. xv., p. 7, 1877, on the same subject, and quotes from Figuiet's *Insect World* the following account of the pupation of *Urtica*: "The chrysalis, which is shorter than the caterpillar, is at some distance from the silky net-work to which it must fix itself; it is only supported by that extremity of the caterpillar's skin which has not been split open. It has neither legs nor arms, and yet it must free itself from this remaining part of the skin and reach the threads to which it is to suspend itself. The supple and contractile segments of the chrysalis serve for the limbs which are wanting to it. Between two of these segments, as with a pair of pincers, the insect seizes a portion of the folded skin, and with such a firm hold that it is able to support the whole of its body on it. It now curves the hinder part slightly and draws its tail entirely out of the sheath in which it was enclosed," &c. Dr. Osborne then says: "How this can be conceived possible, considering the utterly soft condition of the newly-excluded pupa, and that the caterpillar skin is now reduced to a packet so small that it covers only the end of the tail of the chrysalis (*loc. cit.*), in which moreover there are no longer any free segments, I cannot understand. On the other hand, it is very easy to show that the last and sufficient bond of connection between the chrysalis and the old larva skin is a membrane extending from the lining of the latter to the anterior horns of the two lateral ridges bounding the anal area of the chrysalis. . . . I have tested its strength to sustain the weight of the chrysalis and the time during which it resists desiccation and the writhings of the insect, the obvious object of which is, not to get rid of the old caterpillar skin, but to rupture this membrane after the chrysalis has made good its tail attachment to the silk." The communication in *Nature* called out no reply or remark from lepidopterists, and hence Dr. Osborne again recited the facts in the *Ent. Mo. Mag.* The Editors thereof say: "We will be very glad to know if the very reasonable explanation advanced in support of the theory of our correspondent has been elsewhere referred to, and also to have the results of direct experiment by others. So far as we can discover, most of the published accounts are simply copied, or extracted from Réaumur."

As soon as I read this communication, I sought for butterflies of this family, and soon took females of *Grapta interrogationis* and *D. archippus*. The former laid many eggs in a bag, tied over a stem of hop, and the other a few on *Asclepias*. The larvæ from both lots have finished their pupation, and I have carefully watched the process. Dr. Osborne's statement

is correct. The chrysalis of *Grapta* is supported by a narrow, white membrane or ligament, about one-tenth inch long, one end of which is pointed and fastened to the inner side of the larval skin near the extremity thereof, and the other is forked and fastened to the ends of two curved, slightly raised, longitudinal ridges, which are to be found on the ventral side of the last segment. These ends are at the anterior edge of the segment. They project sufficiently to form hooks, as it were, which hold the membrane firmly. In *archippus* the ligament is much larger and stronger than in *Grapta*. It is broad, black, and deeply forked where it attaches to the segment. In this species, instead of low ridges, there are two rows of shining black processes, three in each row, and the outer pair are knobbed, and a little pointed anteriorly. On these outer knobs the ligament is fastened. I do not believe that the chrysalis of *Grapta* ever seizes the loosened skin *for a support*—at any rate any support that such a hold could furnish is not essential, for I have repeatedly raised the skin with forceps entirely off the abdominal segments on the ventral side, so as to discover the distended membrane, and in several cases have cut the skin off just below the membrane at the instant the effort was beginning for freeing the tail. In these last cases the chrysalids were seen to be connected with the skin by the membrane only, and the membrane is the lever by which the chrysalis climbs to the silk. There could not possibly have been any other support.

Réaumur's account of the pupation of the *Suspensi* was drawn up after very extended observations on larvæ of several species of *Vanessa* principally (he says, several hundred caterpillars), and is given at great length. Similar statements are given by subsequent authors, often based on direct observation, but so far as I can discover, one and all describe the process as it would appear to a looker on. I notice in Westwood and Humphrey's *British Butterflies*, p. 54, what is doubtless an inadvertent error: "The chrysalis carefully withdraws its tail from the skin, *seizing hold of the outside* of the latter by pressing two of the rings of its body together, and enclosing between part of the old skin. *By repeating this process*, it at length pushes its tail upwards, till it reaches the silken button," &c. For *outside*, read *inside*.

Dr. Harris, *Ins.*, 2nd ed., p. 282, gives an account of the transformation of *archippus* with much detail.

"By bending together two of these rings near the middle of the body, the chrysalis seizes, in the crevice between them, a *portion of the empty*

skin and clings to it so as to support itself while it withdraws its tail from the remainder of the skin. It is now wholly out of the skin, to which it hangs suspended by nipping together the rings of its body; but as the chrysalis is much shorter than the caterpillar, it is yet at some distance from the tuft of silk, to which it must climb. To do this, it extends the rings of its body as far apart as possible, then, bending together two of them above those by which it is suspended, it catches hold of the skin higher up, at the same time letting go below, and by repeating this process with different rings in succession, it at length reaches the tuft, &c." "We may see the whole process in the caterpillars of *archippus*," &c. Dr. Harris drew his description from nature, and was too careful an observer to commit himself in a case like this beyond what he thought he clearly saw.

In Butterflies of N. America, vol. I., I gave an account of the transformation of *Grapta comma*, taken strictly from my own observations. In this I find no mention of the climbing by the aid of the successive pairs of segments, described by Dr. Harris as taking place in *archippus*, but otherwise my statement agrees substantially with his. I had previously read of the transformations of butterflies in various works, and so was doubtless prepared to receive the common version of the mode, but I described precisely what I thought I saw. I have heretofore repeatedly witnessed this process in various genera, but I find by recent experience that it is impossible with a single observation, or by half a dozen, to determine all the details, and only by watching one point in one example and another in the next, and verifying each again and again, could I feel sure that I had made myself acquainted with this part of the history of a single species. I have watched sixteen transformations of *interrogationis* and two of *archippus*, during the last few days, and will describe at length what I have seen. It may serve to show how the error spoken of originated and has been perpetuated by so many observers, and for more than a century, with no suspicion of wrong till Dr. Osborne made his discovery. In *interrogationis* the period of suspension varies from 6 to 24 hours, according to the state of the weather and degree of warmth. My first observations were made under a clear sky, and mercury about 80° Far., in the middle of the day; the later ones in cool and rainy weather, with cold nights. The larva of this species is suspended from a button of pink silk. At first it holds itself in a circular shape, its head turned in against segments 11 and 12, the lowest part of the curve being at 7th. After two hours, more or less (in warm weather), the curve is relaxed, and the atti-

tude resembles figure 6, the dorsum on last segments being convex, the head turned in opposite 8 and 9, the lowest part of the curve being at 6th. Two or three hours later the body hangs straight, and the four anterior segments are bent almost at a right angle to the others. The head continues to droop, and by this it is made certain that the final change approaches. Presently there is a twitching of the spines, first confined to one segment, but extending soon over the whole body, and changing into a waving motion. This is accompanied by a twisting of the segments beneath the skin, which increases in strength and continues some minutes. Two or three times a spasm of contraction comes on by which the body is lifted up into the last one or two segments and let fall again. Then a creeping movement under the skin commences, extending from the posterior segments forward, and seems to break the skin loose from the body, and one wave after another runs along till the distended skin on the anterior segments bursts. This always takes place on the middle of the dorsum, on the 3rd segment, and the mesonotum of the chrysalis is forced through, splitting the skin up to the head (or first segment), and sometimes splitting the skin of the head also. By the continued creeping movement the body is slowly forced through the rent. As this is oblique, the ventral side of the chrysalis is fully three segments behind the dorsal in the divesting, the skin on the anterior segments fitting tight as a glove, although it is loosening and packing in a mass about the anal feet. In about 90 seconds from the time of the rupture the skin on dorsal side has been pushed back to 10, and the effort begins for the extrication of the tail of the chrysalis from the caterpillar skin. This tail must be withdrawn and fastened outside the skin to the same button of silk which the caterpillar clung to. At this instant the skin covers the ventral side of the chrysalis to 8th segment, but is moving up constantly, and as the chrysalis bends the posterior half of the abdomen sharply back to force the tail out of the sheath, the segments are pinched together and there is at the same time a pinching in of the skin. But there is no seizing of the *outside* of the skin; if there were no other reason, the spines would make this impossible. The tail now free, the chrysalis straightens itself up, and swinging on the ligament, lifts itself towards the silk, the last segment describing an arc of a circle of which the ligament is the radius, and the tail, which at the same instant is curved forward, is brought round and over the considerable packet of the old skin and with precision strikes the silk. An observer, knowing nothing of the

ligament, seeing only the violent contortions, the abdominal segments expanding and contracting to the utmost, while at the same time the chrysalis steadily rises toward the silk, naturally concludes that the one movement is the direct result of the other. When I lifted the flap of skin entirely clear of the struggling segments and cut it off a little below the tail, the bendings and contortions were not interrupted by my interference, nor was the effort to reach the silk in the least abated. Held firm by the stretched ligament, which was in plain view, the body rose, and the tail, which had got well outside the padded skin, and was before complete extrication bent backward, now bent forward, and by the upward swing was brought exactly to the silk. Several times as I was lifting, the skin and chrysalis together were dislodged, and fell into my hand. Then by drawing the skin back the ligament was exposed and it was distinctly seen that it was attached to the chrysalis by the pointed ends of the ridges before mentioned, and that there was no other connection between skin and chrysalis.

After the hooklets of the tail are caught in the silk, the chrysalis whirls one way and then the other, the last segments actively twisting and screwing in order to fasten the hooklets more securely. This movement does not seem to be made for the purpose of rupturing the membrane or for getting rid of the old skin especially, for I noticed that whenever the skin parted and fell just as the silk was grasped, as did sometimes happen, the same whirling and all the movements usually seen followed. It is a wonderful exhibition, and the last act is beyond my comprehension,—namely, the rising of the chrysalis with no external aid save what comes from the ligament. I can only state the fact.

When the rupture of the skin of the caterpillar of *interrogationis* first takes place, and the mesonotum is made to appear, this organ is pressed down and flattened, but in a short time, and before the transformation is completed, it swells out, and becomes nearly as large and as prominent as it ever will be; the head case is pushed forward on the thorax and jammed in, so that on first issuing, the chrysalis is truncated at the anterior side of the mesonotum. When the skin is thrown off, the chrysalis hangs limp and distended, like a long cone, with no prominences except the mesonotum. Presently the segments shorten and become broader, the ends of the wing cases creep nearer the tail, the tuberculated points on the abdomen swell out, the head case pushes up, with its palpi cases, and in course of half an hour the final and characteristic shape is assumed.

The change in these respects is nothing like so striking in *Grapta* as in *Limenitis*, where the chrysalis is greatly hunched and displays a prodigious mesonotum. In this case the chrysalis is at first as limp and shapeless as in *Grapta*, but reaches its proper form in the same way; the segments contracting and the processes growing and maturing as one looks at them.

The transformation of *archippus* presented a close resemblance, but some differences. When first suspended, which it did from a pad of white silk, the larva took the attitude of an oval, the head brought near 12th segment; a few hours later that of figure 6; and finally of a right angle, the head continuing to droop. During the last two hours there was a constant movement of the head, which seemed to rub itself on the anterior legs, and several times and up to within one-half hour of the change, the larva doubled itself up and brought its head to the button of silk, as if greatly annoyed at something there. This I noticed in both the larvæ observed. Finally the body was contracted and lifted up as in *Grapta*, and a slight creeping movement was seen, but there were no twitchings or twistings as in *Grapta*. The creeping became stronger, advancing in waves, and the strain on the anterior segments became severe, till the skin burst on the dorsal line of 2, 3 and 4, and the top of the head also was rent. The slit was oblique, and the ventral side was covered three segments beyond the dorsal. When the body was exposed on dorsum at 10 and 11, the ventral side was covered at 8 and 9, and the skin fitted tight, so that as the body bent back in the movement to free the tail the skin was pinched between the segments. The struggle became violent, the segments all along the abdomen stretching to the utmost, and then contracting forcibly, *one telescoping into the next*; and *in this the skin followed the segment, and was drawn in and held for an instant*. As this movement ran through the segments successively the skin was pinched at one joint after another, and the chrysalis was evidently rising towards the silk as described by Dr. Harris. Unfortunately I was able to see the transformation in but two examples of *archippus*. In the first one, I set myself to see how the whole change must have appeared to Dr. Harris, as he had described it minutely. In the next one I lifted the flap of skin till I saw the ligament. In so doing the whole thing unhooked from the silk, and as it lay in my hand I pulled back the skin and was able to look at the ligament with a lens. I also lifted the chrysalis by the skin, and the ligament did not part. It did so afterwards only by a strenuous effort

of the chrysalis, and then remained distended, with its forks in shape. The nature of this organ must be determined by further observations. I had sent to a friend, who is an experienced microscopist as well as entomologist, a chrysalis of *interrogationis* which had been dropped in glycerine at the crisis of pupation, and he writes me thus: "I have examined the preparation, which was in good condition except the separation of the chrysalis from the skin. I see what you call the two ridges, which exist also in the caterpillar and have between them the anus in both caterpillar and chrysalis. Further, I find connected with the skin the whole rectum, and a little more of the intestinal canal, drawn out in pupation. A little below I see a substance which I suppose to be your membrane, about as long as the rectum and structureless. I would suppose that the membrane belonged to the rectum and perhaps the external cover of it, if you had not written that the membrane in *archippus* is black. I took a caterpillar (in spirits) of this species, and opening it, found that the rectum was white, or at least light colored. One should make a section of the caterpillar of *archippus* just after suspension to discover where this black membrane comes from. The use and purpose of the knobs and bars in the chrysalids is doubtless this: in these organs are built up and developed the anal appendages of the imago."

September, 1878.

NEW N. AMERICAN LEPIDOPTERA, WITH NOTES ON A
FEW LITTLE KNOWN.

BY A. R. GROTE, A. M.,

Director of the Museum, Buffalo Society Natural Sciences.

Daremma catalpae.

Sphinx catalpae Boisd., pl. 2, figs. 1, 2 (1874).

This species is represented in the Collection of Mr. E. L. Graef by an example from Florida. It is smaller and darker than *D. undulosa* or *D. Hageni*, of a uniform butternut or olive brown tint.

Emydia ampla, n. s.

♀. Wings large, body linear, slight. Eyes naked; palpi exceeding the front; maxillæ weak. Antennæ (♀) with converging setose pectinations. Head white; thorax white, black dotted. Fore wings white, silky, with a black dot on the cell and two superposed at the extremity of the cell; one below median vein at basal third and others at base suggesting a basal transverse line. A narrow blackish costal stripe and a terminal distinct interrupted line; fringes white. Hind wings smoky gray with whitish fringes. Beneath entirely blackish or smoky gray with a dark discal dot on hind wings. Abdomen smoky gray. *Expanse* 43 mil. *Habitat*, Colorado (Coll. E. L. Graef).

Lygranthoeia acutilinea, n. s.

♂. Eyes naked, body slender, tibiæ armed. Form of *marginata*, *Thoreaui* and *saturata*. Ochrey or olive fuscous with snow white or silvery white lines. Transverse anterior greatly medially and outwardly exerted, preceded by a black marginal line, irregular, raggedly toothed. Cell shaded with whitish or pale ochrey. Reniform marked by black dots. Outer line denticulate, followed by a black line, crossed by white streaks on the median nervules. Subterminal line white, bent inwardly opposite the cell and again before internal margin. Fringes fuscous cut with white. Hind wings whitish with diffuse blackish discal spot and terminal band, the latter interrupted with white above anal angle. Fringes whitish, faintly interlineate. Beneath whitish, powdered with black; primaries blackish to exterior line with double black discal spots, the reniform open, fringes checkered; secondaries mostly whitish with black discal dot and whitish fringes; body pale fuscous. *Expanse* 27 mil. *Habitat* Colorado, Coll. E. L. Graef.

Heliothis nuchalis Grote.

This species is very near the European *H. scutosa*, as I find from a specimen of the latter in Mr. Graef's collection. As is the case with *armiger* and *dipsacea*, the American representatives of which I have described as *umbrosus* and *phlogophagus*, we have now a third species nearly related to the European. At the same time extended and careful comparisons of the American and European forms have not been entered into as yet with any of these species of *Heliothis*.

Melicleptria oregonensis Hy. Edw.

This species has been sent me by Dr. Bailey from Nevada (No. 19).

Chytoryza tecta Grote.

This genus is characterized by a pellucid impression on the fore wings of the male on the cell before the transverse posterior line. In the shape of the wings it differs from *Pteraetholix bullula* and in the thinner labial palpi. These two genera from Alabama and Texas seem to be our nearest allies to the genera *Anomis* and *Aletia*.

Catocala cælebs Grote.

Another specimen of this rare species has been taken by Mr. Hill this season in the Adirondacks. This species has the fore wings black and gray. What is probably a variety of *C. badia*, with brown primaries, but with the lines better marked than in the type, has passed erroneously as *C. cælebs* in several collections I have recently seen. Probably this mistake has led to the belief that *cælebs* was only a form of *badia*.

Asopia cohortalis, n. s.

♂. Allied to *squamealis* and with blackish fringes and distinct black terminal line. Head and thorax, basal and terminal fields of primaries ochre brown. Median space shaded with black. Inner line dentate as in *squamealis*, black, preceded by a paler ochre shade. The pale shades are well marked on costa, but do not spread or form blotches as in *squamealis*. Outer line upright, a little bent in on costal region, denticulate, black; it is further removed from external margin than in *squamealis*; between the lines are three costal marks; the two median lines are parallel, the distance between them remaining the same. Hind wings fuscous with double blackish lines; fringes interlined with black; a terminal black line; fringes fuscous. Beneath the primaries show a series of costal marks to the common outer line, which is black; beyond the line the terminal field is shaded with ochre. A dotted terminal black line; fringes fuscous, interlined. *Expanse* 25 mil.; Colorado, Mr. E. L. Graef. The color and position of the outer line are different from *squamealis*.

Agrotis piscipellis, n. s.

♂ ♀. A species with simple antennæ, armed tibiæ, naked eyes and untufted thorax, and somewhat flattened abdomen, which resembles *Ufeus*

plicatus or some of the species of *Homohadena*,* such as *induta* and *incomitata*. Thorax and fore wings dark but bright brown, veins more or less marked with black, stigmata obsolete, median lines sometimes obsolete, when present black, narrow, single; t. a. line upright, rivulous; t. p. line denticulate, exserted superiorly, marking venular points, followed by a faint pale shade; s. t. line pale. Hind wings pale at base, smoky outwardly, sub-pellucid, veins darker, no discal dot above or below. Front and tips of palpi very deep brown. Beneath pale, washed with reddish, a common black even line, veins indicated. Thorax and appendages and abdomen beneath rosy brown. Collar unlined. *Expanse* ♂ 34 mil. (Colorado); ♀ 40 (Nevada); from Dr. James S. Bailey. May be placed with the *albalis* group, but resembles no species very nearly. Body not hairy as in *U. plicatus*.

Agrotis cupida.

This species seems to be subject to unusual variation. What may be taken as the typical form, or that which is best marked, expands 33-35 mil., the wings are of a brick brown with the stigmata filled with black, a black mark on costa at inception of s. t. line, the s. t. space a little darker than the rest of the wing, the lines well defined. A larger form from Texas expands 40 mil.; it has been reared from the larva by Belfrage (No. 674). It is more red, more unicolorous, the markings less obtrusive. A specimen taken by Dr. Bailey is the size of the typical form, but has the sub-basal and subterminal spaces entirely filled in with black. Then come three specimens in which the fore wings seem a little narrower and the expanse smaller. One is bright orange red, all the markings obsolete. Another is more of the typical shade, but both stigmata are ringed with bright yellow. The third I have described as distinct, under the name *brunneipennis*. This one, from Mr. Thaxter, is a little smaller than the others, expanding hardly over 30 mil. It is dark red-brown, almost immaculate. Whether these three belong to a different species from *cupida* remains doubtful.

Agrotis cupidissima.

It seems to me now probable that *lactula* is not sufficiently distinct from this Californian form. In the type of the latter the ground color is

* I can find no character to separate *Metahadena* from this genus, to which I would accordingly refer *H. atrifasciata* (Morr.)

darker, more purplish brown, while *cupidissima* is pale reddish clay color. But the powdery markings are the same in shape, and, bearing in mind the variation in *cupida*, it seems easy to include *laetula* as a form of *cupidissima*. At the same time the body seems slenderer in the type specimen I have, and the form more compact. These forms all have the collar unlined.

Agrotis placida.

A dark form with pale terminal space, but much smaller than *alternata*, which Mr. Hill has taken in the Adirondacks. Four specimens sent me from Nevada may be forms of this species. They all come from Dr. Bailey. One has the fore wings shaded with brown, median and terminal space both paler, markings quite distinct. Another is almost unicolorous blackish with the shadings and markings powdery. Again, another has a reddish cast reminding one of *cupida*, but with pale terminal space. It does not seem possible that these Nevada specimens belong to distinct species, but for some time to come it is evident that our determinations in this group will be provisional unless we can find other characters than coloration and size to distinguish the "species."

Agrotis alternata.

A heavier form than *cupida*, the terminal space contrasting and paler. Varies much in tone; some specimens shaded with orange or reddish brown. Generally it seems of a clay color. One specimen from Nevada (Dr. Bailey) may be a distinct species. The median lines are more prominent and shaded with pale scales; the terminal space strongly contrasts. It is more likely, however, to be an extreme variety. *Agrotis orbis* from California may only be a form of *alternata*. I have a specimen from Colorado which seems intermediate, but which I refer to *alternata* provisionally. I have recently identified *Glaea anchocelioides* of Gueneé, which resembles some varieties of *alternata*, but has unarmed tibiae.

Hadena senescens, n. s.

♂ ♀. Male antennae simple, ciliate; eyes naked, lashed. A tuft behind the collar and on the thorax behind. Tibiae unarmed. Primaries straight along costal margin; wings rather broad. Pale dust color with the costal region to s. t. line of primaries shaded with brown. Lines double. Orbicular oblique, narrow above, rounded below. Reniform large, pale with internal black annulus. Disc between the spots black.

Subterminal space shaded with brown, showing the pale ante-apical dots distinctly. S. t. line marked with black before internal margin as in *vigilans*. A scalloped pale terminal line, interrupting the brown fringes. Hind wings blackish with pale terminal border and discal lunule. Beneath shaded with reddish; dark discal lunules, double common shade lines, pale terminal border on both pair. Head and collar shaded with brown; pectus and legs blackish beneath; abdomen purplish-brown. Front and palpi blackish. *Expanse* 36 mil. Taken by Mr. Hill in September in Lewis Co., N. Y. Allied to *Hadena vigilans*.

Hadena algens, n. s.

♀. Eyes naked, with lashes. Head not prominent but, as in *vigilans* and *senescens*, rather closely applied. Stone gray with inconspicuous markings. Collar pale with narrow black edging. A slight black basal dash. Lines and spots inconspicuous. Orbicular bordered on inside with black, edged with pale, subquadrate; reniform narrow, kidney-shape, both spots upright, incompletely edged with black and pale scales. S. t. line pale, irregular, marked with black on submedian fold. A terminal even dotted black line. Hind wings dark gray, reflecting the double lines and discal lunule of under surface. Beneath gray; discal spot of primaries open and nearly obsolete, on hind wings dark shade. The terminal space on both wings paler than rest of wing. *Expanse* 30 mil.; Maine, Prof. Fernald.

The three species here alluded to will be separated eventually from *Hadena*, but at the moment I refer them to the typical genus of the subgroup to which they belong.

Mamestra neverca, n. s.

♂ ♀. Eyes hairy. Male antennæ simple. Fore wings of a mossy brownish olivaceous. Orbicular margined with black, open to costa, rounded, moderate. Reniform pale, elongate, subquadrate, erect. T. p. line double, pale centered, followed by points on the veins, outwardly oblique to vein 4, thence inwardly oblique, nearly straight, below reniform to internal margin. Subterminal line pale, irregular, preceded and followed by black marks over the middle of the wing. Fringes concolorous, preceded by small black points and cut with pale. A black median basal dash or shading. Thorax concolorous; tegulæ shaded with blackish. Hind wings whitish at base with discal mark and broad smoky border.

Beneath dusty gray with traces of double common lines and discal marks. *Expanse* 34 mil. Nebraska, Colorado, Dr. James S. Bailey. This species is allied to *Goodellii*, but it more closely resembles the following species, which, owing to the naked eyes, must be separated generically.

Hadena genitrix, n. s.

♀. Eyes naked. This species is of a mossy blackish olivaceous with the ornamentation effaced. From the shape of the t. p. line, the position of the reniform and the excavation of hind wings, it is allied to *curvata*. Claviform outlined in part with black. Orbicular spherical, complete, somewhat widely separate from the pale, half-erect, rounded reniform, which is contiguous to the t. p. line. T. p. line pale-centered, double, lunulate, followed by pale points. S. t. line pale; fringes concolorous, cut with pale, preceded by black terminal dots. Hind wings entirely smoky with line and discal mark. Beneath pale, shaded with blackish on disc of fore wings; black discal points, distinct on secondaries and common lines; with sprinkled black scales on both wings. Thorax and head like primaries. *Expanse* 36 mil. Nebraska, Colorado, Nevada, Dr. James S. Bailey. The median lines are further apart than in *M. noverca*, the claviform is indicated, the reniform is somewhat oblique and lies against the t. p. line, which is more uneven than in *M. noverca*. The two species are liable to be confounded unless care is taken.

Apatela theodori, n. s.

♂. Eyes naked; tibiae unarmed. Gray shaded with pale brick red. Head and thorax above grayish, metathoracic tuft reddish; abdomen reddish gray. Fore wings gray with pale reddish shadings. Lines fine, black, single. Basal line arcuate. A fine black streak from base along submedian vein. The nervules also scantily marked with black scales. Sub-basal space shaded anteriorly with reddish. T. a. line slightly outwardly oblique, irregularly lunulate. Median shade marked in black on costa, commencing midway between the lines, greatly exerted medially, irregularly dentate, becoming reddish below costa. Median space before the shade gray, behind it reddish. Orbicular and claviform obsolete. Reniform reddish, large, undefined. T. p. line interspaceally dentate, rounded superiorly, thence inwardly oblique. Submedian space gray, except at costa, much invaded by the acutely and deeply dentate s. t. line which is preceded by black V-shaped shades, the one on submedian fold

crossing the space and forming a dash. Terminal space reddish ; fringes interrupted. Hind wings white with faint mesial line, fringes white. Beneath white with reddish cast and faint reddish common line. Front with a black line. *Expanse* 43 mil. Colorado, Dr. Theodore S. Bailey, for whom I name the singularly colored species.

MICRO-LEPIDOPTERA.

BY V. T. CHAMBERS, COVINGTON, KY.

PHILONOME.

Philonome Clemensella Chamb., *ante v. 6, p. 97.*

I have usually taken this species at the same place, about one or two specimens a year, and always within ten yards of the place where I first took it six years ago. The trees in the immediate vicinity were *Gleditschia triacanthos*, *Ulmus americana*, *Prunus serotina* and *Celtis occidentalis*, but it may have fed as larva upon some weeds or shrubs growing near. All of my specimens were taken about the 8th or 10th of July. This year, however, I have captured (June 14th) two specimens (perfectly fresh) on *Gleditschia triacanthos* at another place, where the nearest tree was *Celtis occidentalis*, growing some thirty yards away. Its larva and food plant, however, are not yet by any means certainly ascertained.

The labial palpi are divergent and ascending, and not quite so long as the maxillary pair. I have stated *loc. cit.* that the antennæ are about two-thirds as long as the wing and pale reddish orange ; perhaps it would be more correct to say that they are a little more than half as long as the wings, with the base reddish orange, and the stalk white tinged with pale orange or yellow. I have also stated that there is a reddish orange transverse stripe across the top of the thorax before its apex, and this is most

often the case ; though sometimes the portion of the thorax behind this streak is reddish orange to the tip, and in perfectly fresh specimens the transverse stripe is made up of raised scales ; the oblique white costal streak has its tip produced a little towards the apex, and is margined behind the tip with brown scales. There are two dark brown hinder marginal lines, one at the base of the ciliæ and the other at their tips and running out into the hooks. The abdomen and legs are silvery yellowish and the upper surface of the abdomen is stained with fuscous.

LAVERNA.

L. circumscriptella Zell.

I have not seen Prof. Zeller's specimens, but I have received from Miss Murtfeldt specimens which, with the aid of Prof. Zeller's figure and description, I recognise without difficulty as belonging to this species. The thorax, head and palpi are white, except that the basal part of the second joint of the palpi is stained with brownish. The fore wings are of a pale grayish ochreous, with the dorsal margin from the base nearly to the middle snowy white, the white crossing the fold at the base, and further back again crossing the fold and reaching almost to the costal margin ; it is margined behind by two small tufts of raised brown scales, as represented in Zeller's figure, and there is another one on the costa not represented in the figure, which again has a minute brown spot in the white at about the basal fourth, which I do not find in my specimens. The figure also gives a very distinct white streak which leaves the white of the dorsal margin at the fold and curves to the costal margin before the ciliæ ; this streak is absent in one of my specimens and much less distinct in the other than it is in the figure. There is a black speck at the hinder angle (indistinct in my specimens) and the apex is dusted indistinctly with brown. *Al. ex.* 5½ lines.

Miss Murtfeldt informs me that "The larva is a pale, glossy, green, cylindrical worm, which feeds upon the immature seeds of *Cenothera* and pupates within the capsules."

A single ♂ from Texas, and one bred ♀ also from there, lack the curved white line on the fore wings figured by Prof. Zeller, and in some of the other females it is indistinct.

MEMORANDA.

Tropical residents continue to visit us. I have in my cabinet two examples of *Sphinx (Argus) labrusca* Linn. One of these was taken at Chicago, the other on a vessel near Mackinaw Straits. Several examples of *Erebus odora* Linn. have been taken here this fall, two very fresh examples having flown into one of our school-rooms during the night.

My setting-pliers, bought several years ago from S. E. Cassino, at Salem, and in constant use since, show decided magnetic polaritis. One point attracts, while the other repels steel pins, etc. The upper end has attractive power. The pliers have never been in contact with a magnet, and have probably never lain in the same position for a week. Is the magnetism due to some mechanical action to which the pliers were subjected in the process of manufacture?

O. S. WESTCOTT, Racine, Wis.

OBITUARY.

It becomes our painful duty to announce the death of one of our correspondents, Mr. W. V. Andrews, of Brooklyn, N. Y., who died on the 20th of October, 1878, after a brief illness, resulting from a sudden attack of paralysis.

William Valentine Andrews was born on the 11th of February, 1811, in Pilton, Somerset, England. At an early age he entered the British service, and served as a private in the Coldstream Guards, rising eventually to the rank of Captain. Subsequently he resigned his commission and removed to Canada, where he resided for several years in London, Ont., engaged in the book and periodical business. From thence he removed to the United States and settled in Brooklyn, where he spent the last few years of his life in the same branch of business, devoting his leisure time chiefly to the study of Entomology, in which he made rapid progress. He had a well arranged collection of Coleoptera and Lepidoptera, and a small but well selected library of Entomological works. His remains were interred at Rosedale Cemetery, New Jersey.

Since his decease his collections and library have been purchased by Mr. John Akhurst, of Brooklyn, N. Y.

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